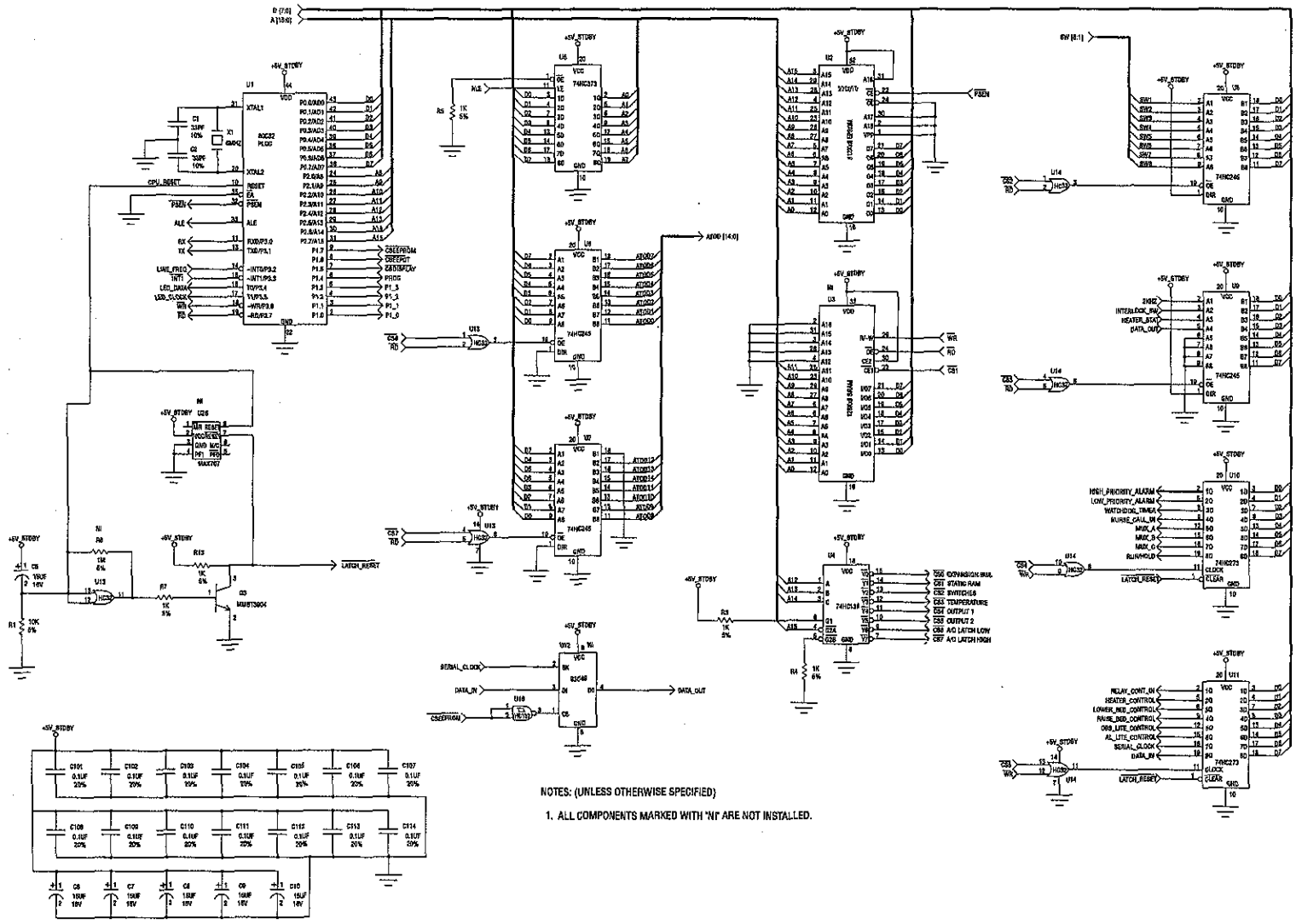


Figure 8-1a
Control Board Schematic-with software revision 06.00 and higher

8/Schematics

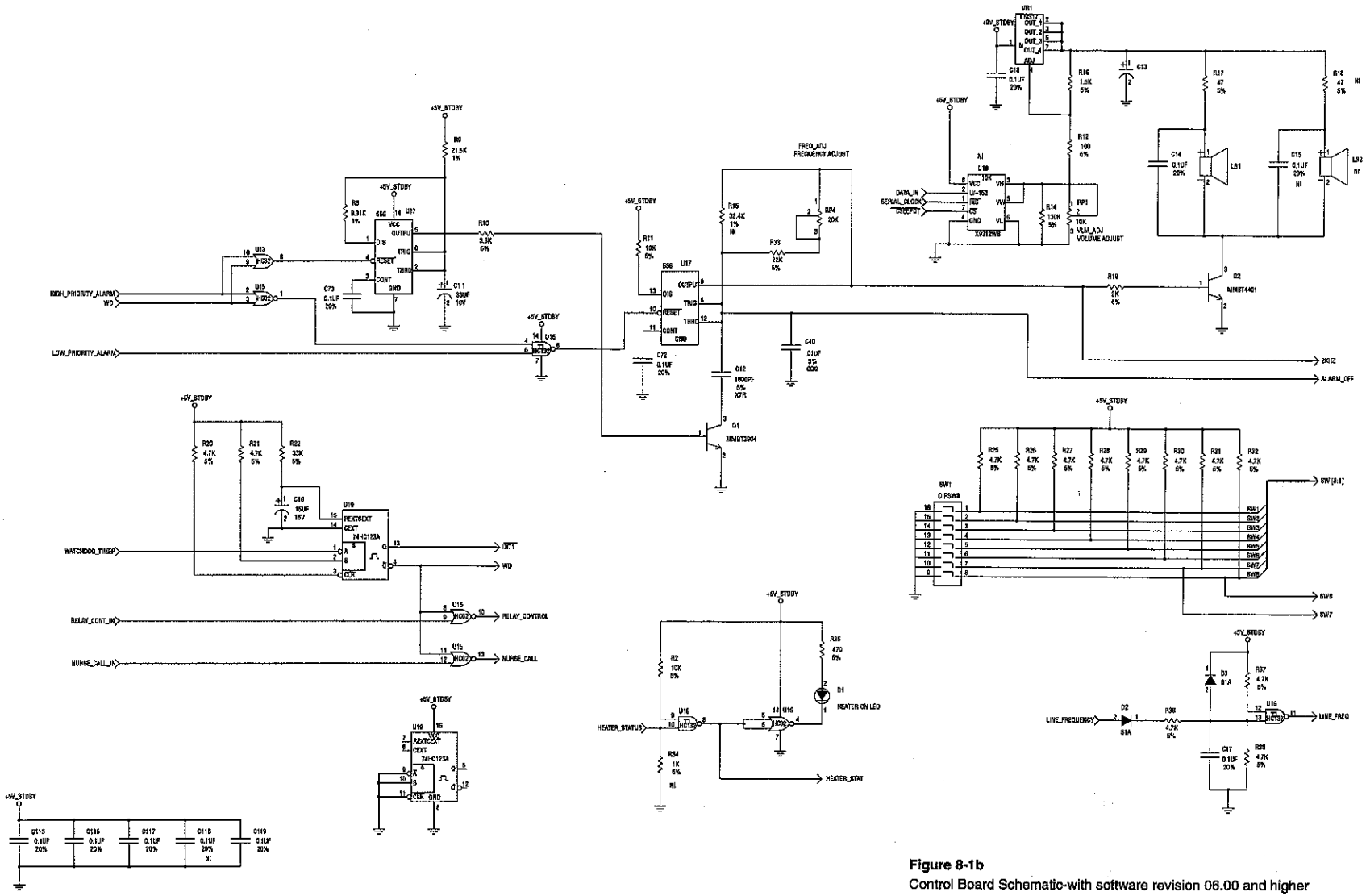


Figure 8-1b
Control Board Schematic-with software revision 06.00 and higher

8/Schematics

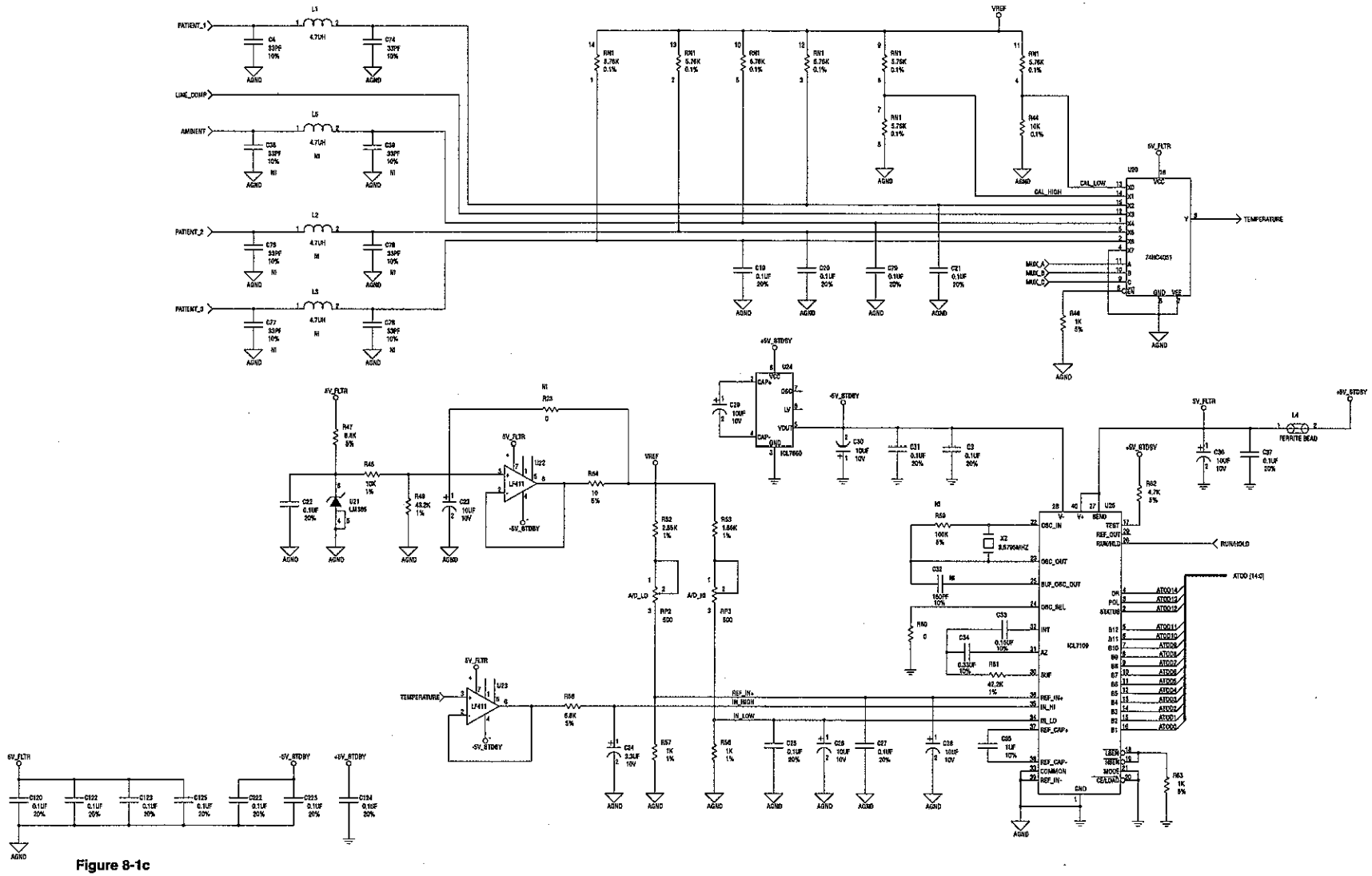


Figure 8-1c
Control Board Schematic-with software revision 06.00 and higher

8/Schematics

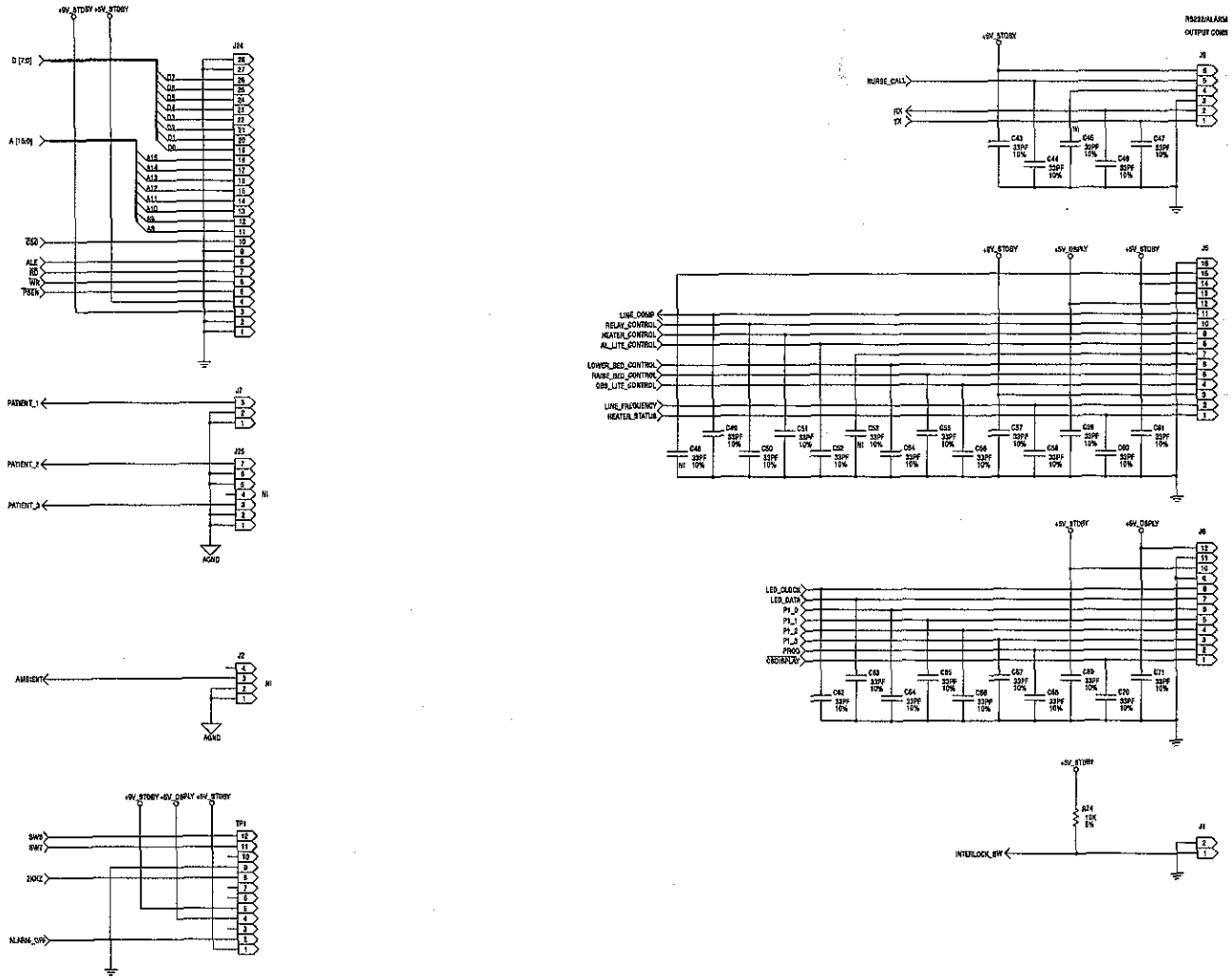
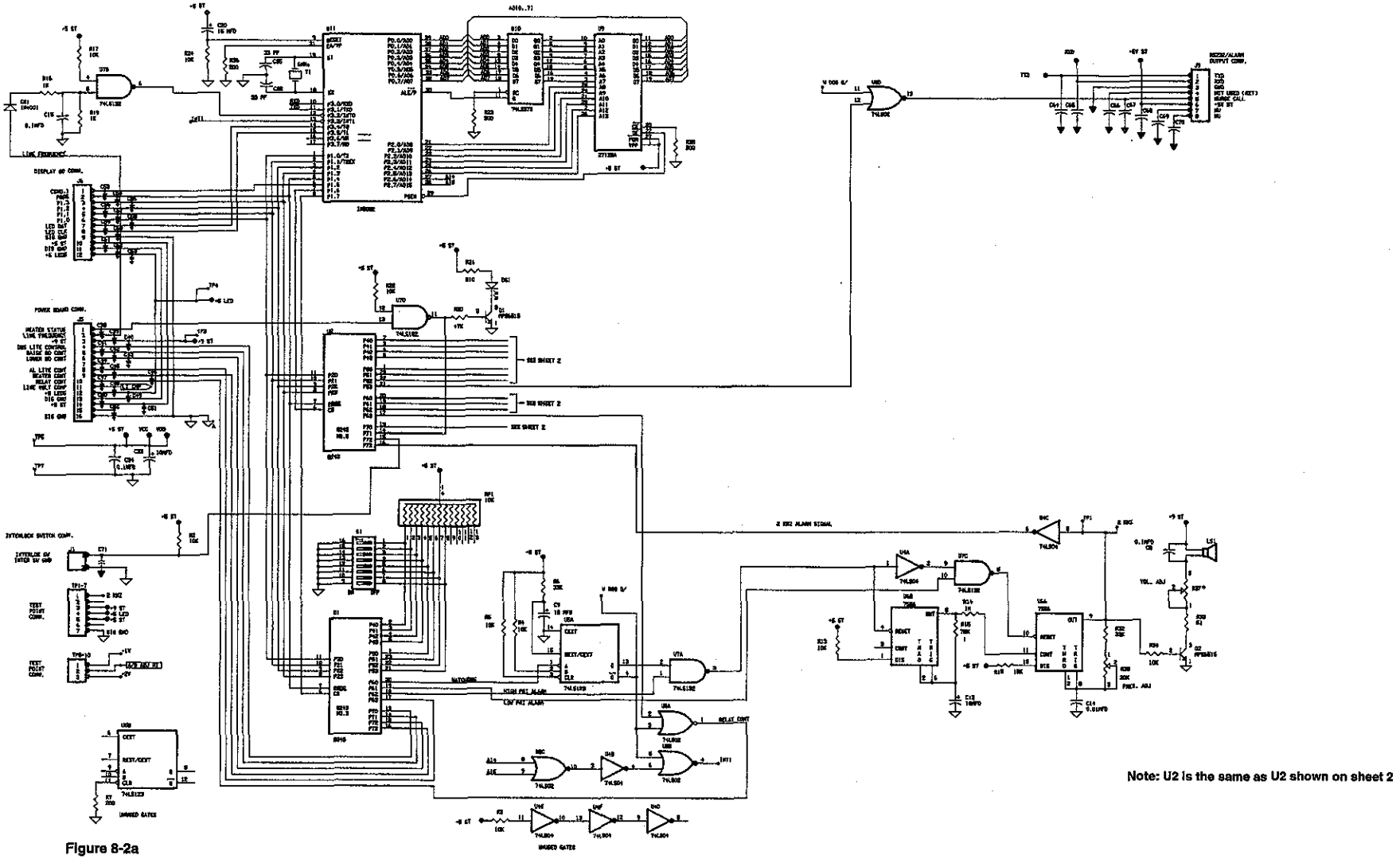


Figure 8-1d
Control Board Schematic-with software revision 06.00 and higher



Note: U2 is the same as U2 shown on sheet 2

Figure 8-2a
Control Board Schematic-units with ADC daughter board

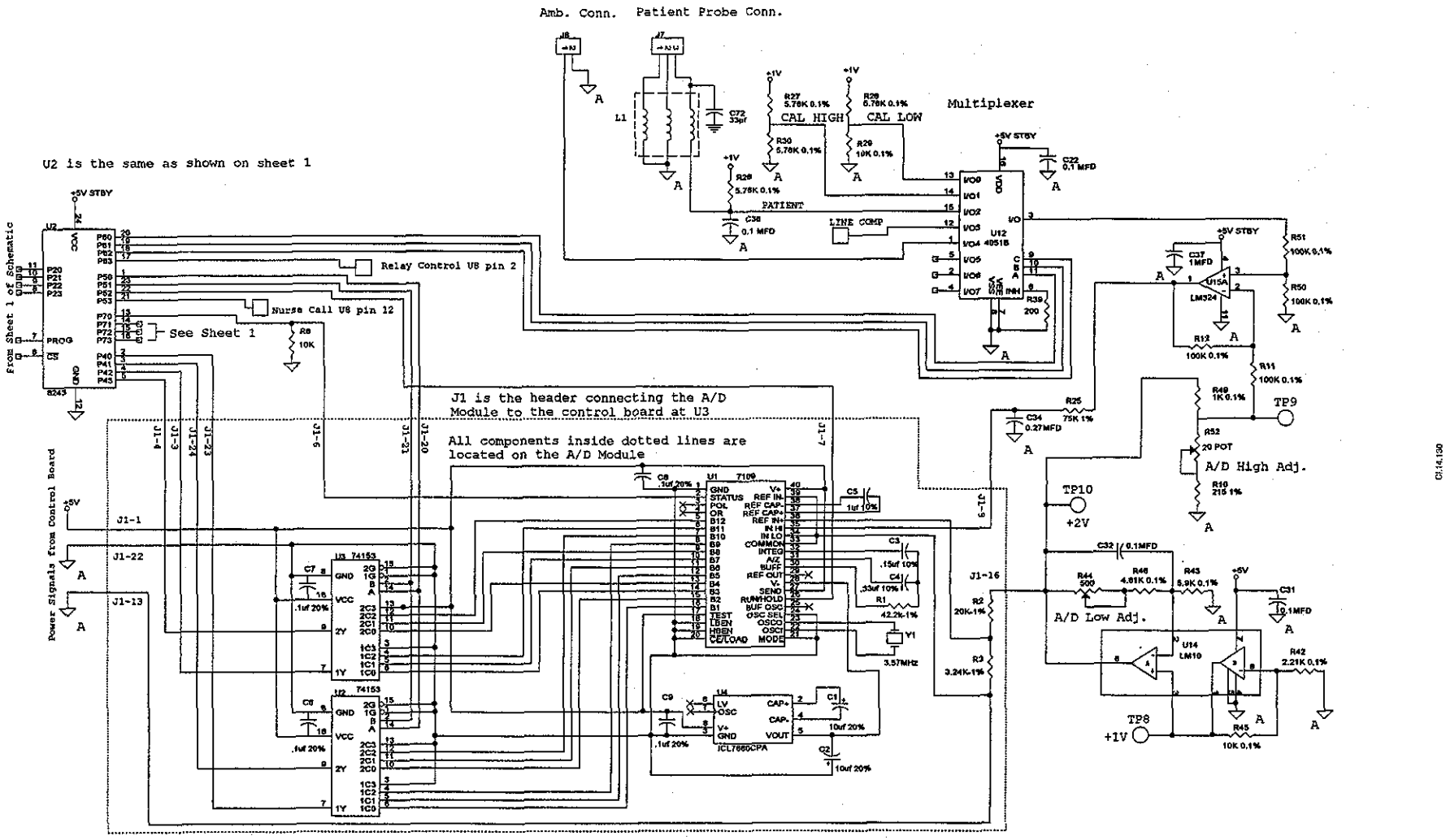


Figure 8-2b
Control Board Schematic-units with ADC daughter board

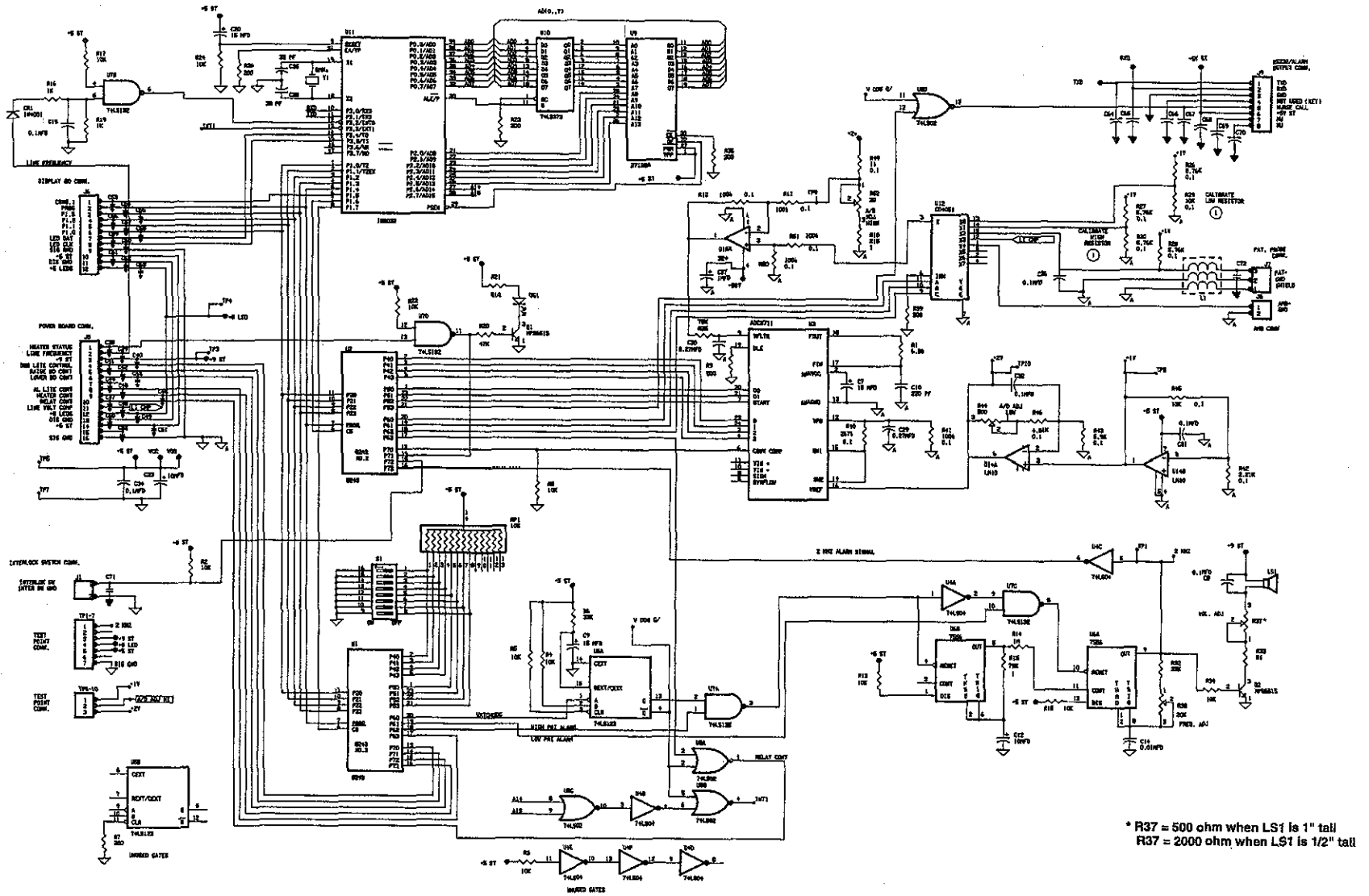
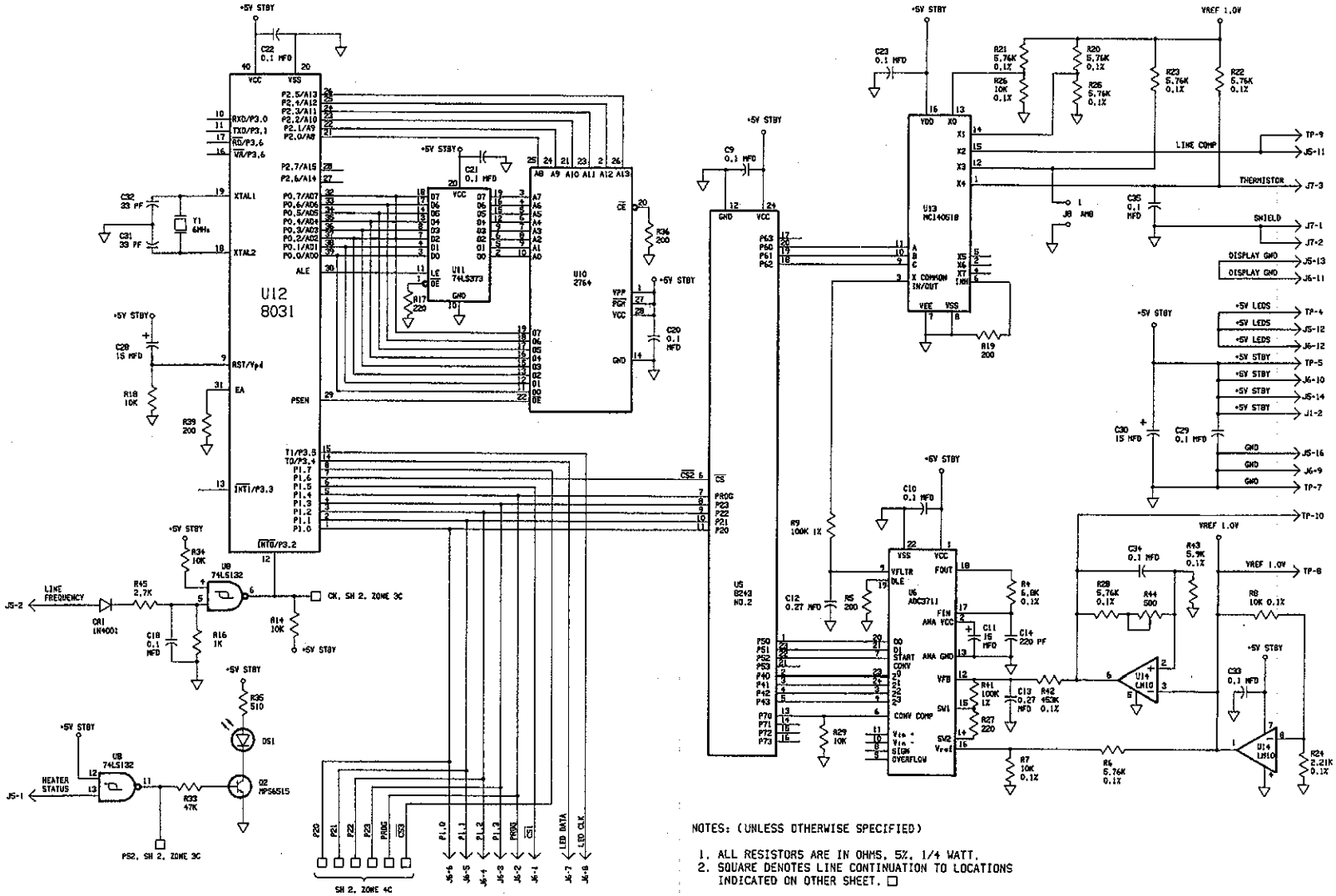


Figure 8-3
Control Board Schematic-units with software revision 04.01 through 05.10



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL RESISTORS ARE IN OHMS, 5%, 1/4 WATT.
2. SQUARE DENOTES LINE CONTINUATION TO LOCATIONS INDICATED ON OTHER SHEET. □

Figure 8-4a
Control Board Schematic-units prior to software revision 04.01

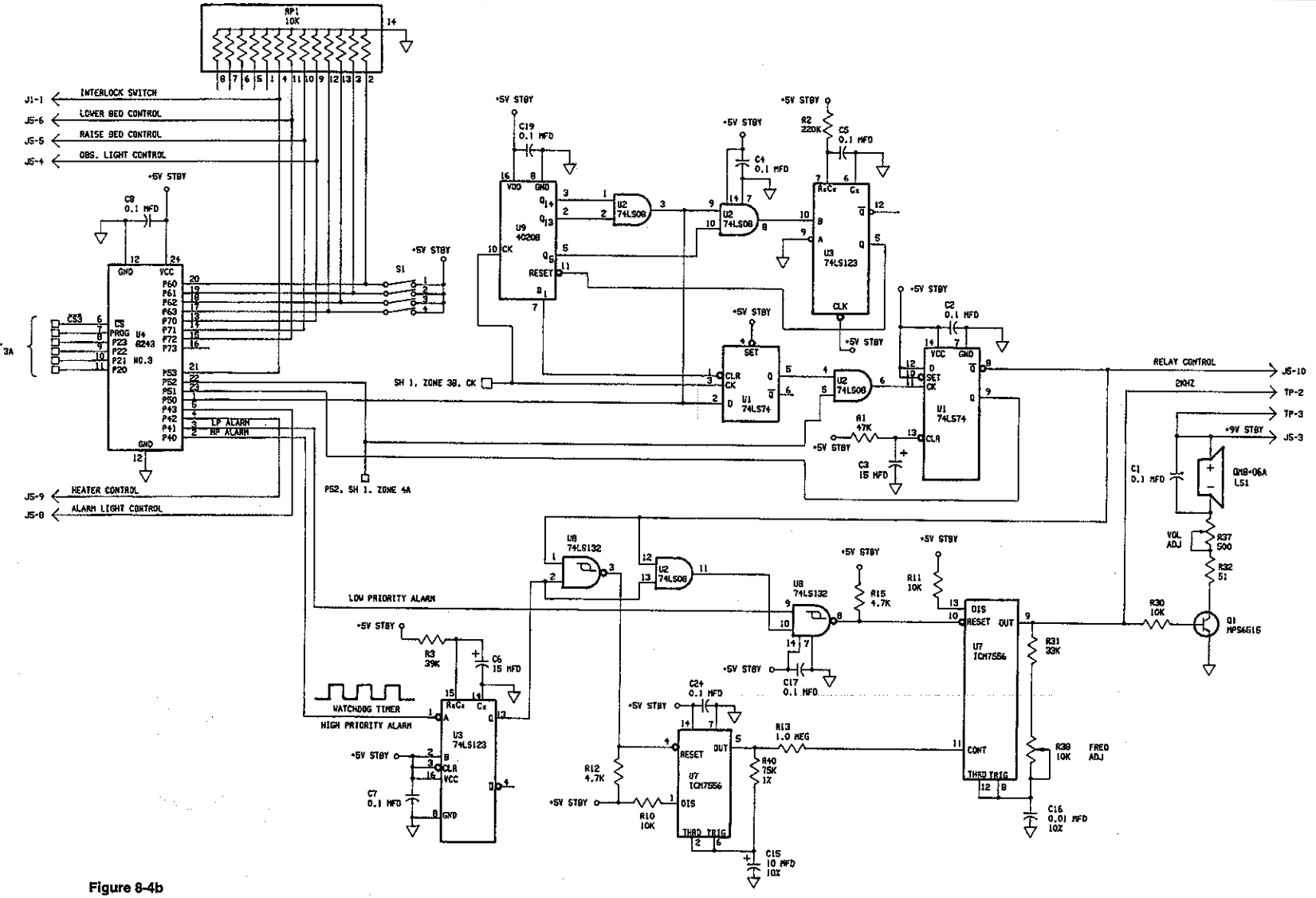


Figure 8-4b
Control Board Schematic-units prior to software revision 4.00

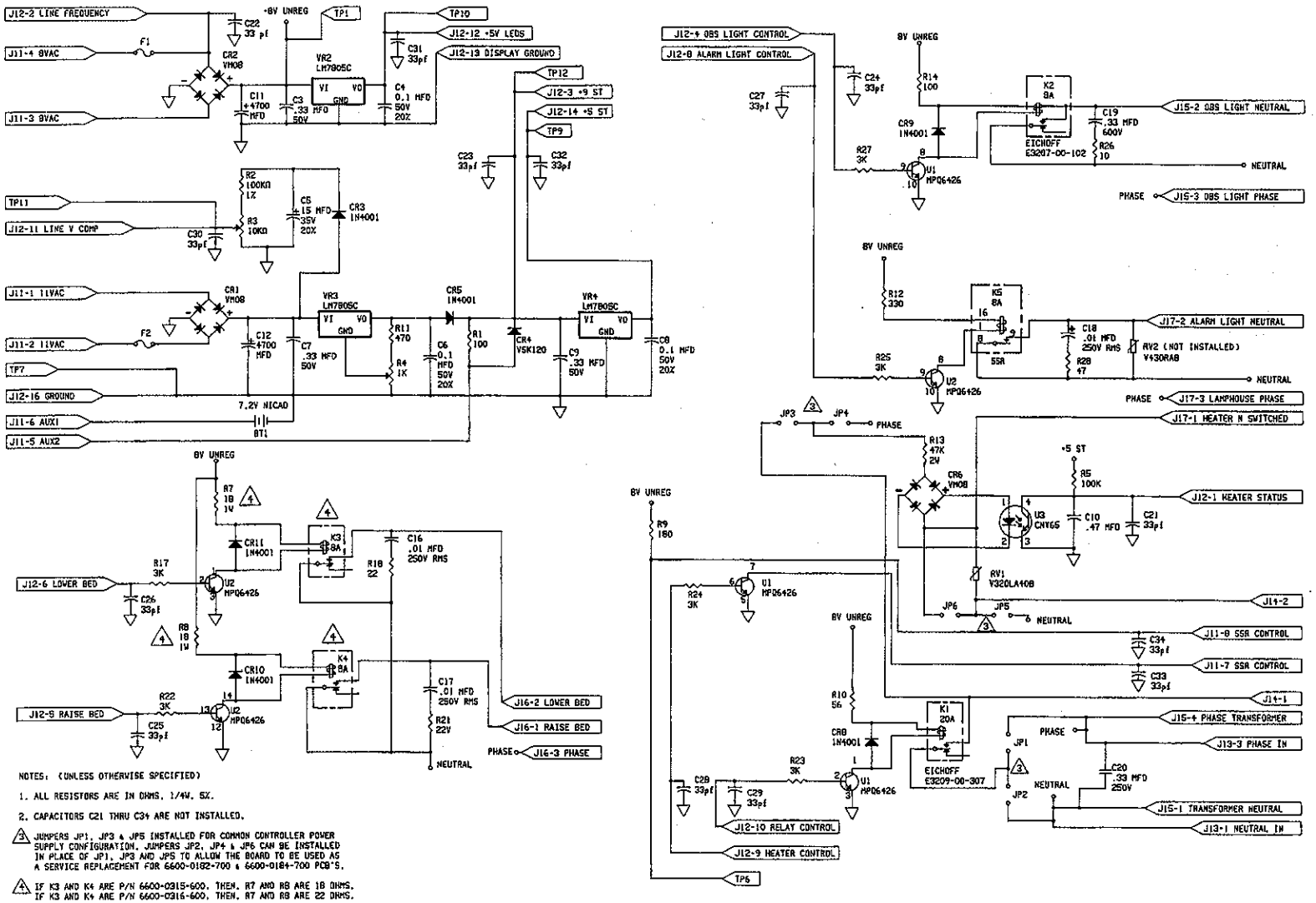


Figure 8-5
Power Supply Board controllers with HCA or HCC serial numbers

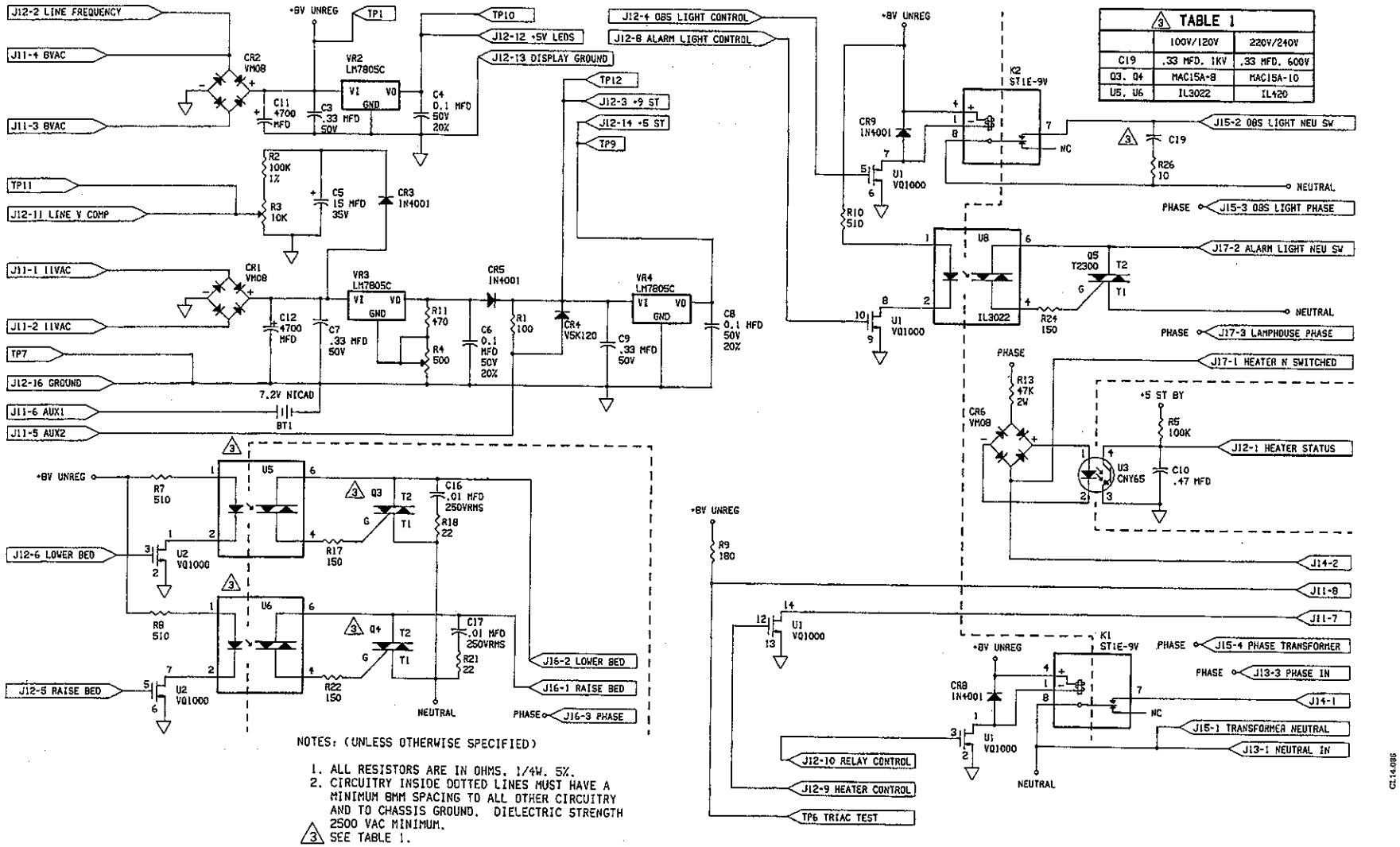
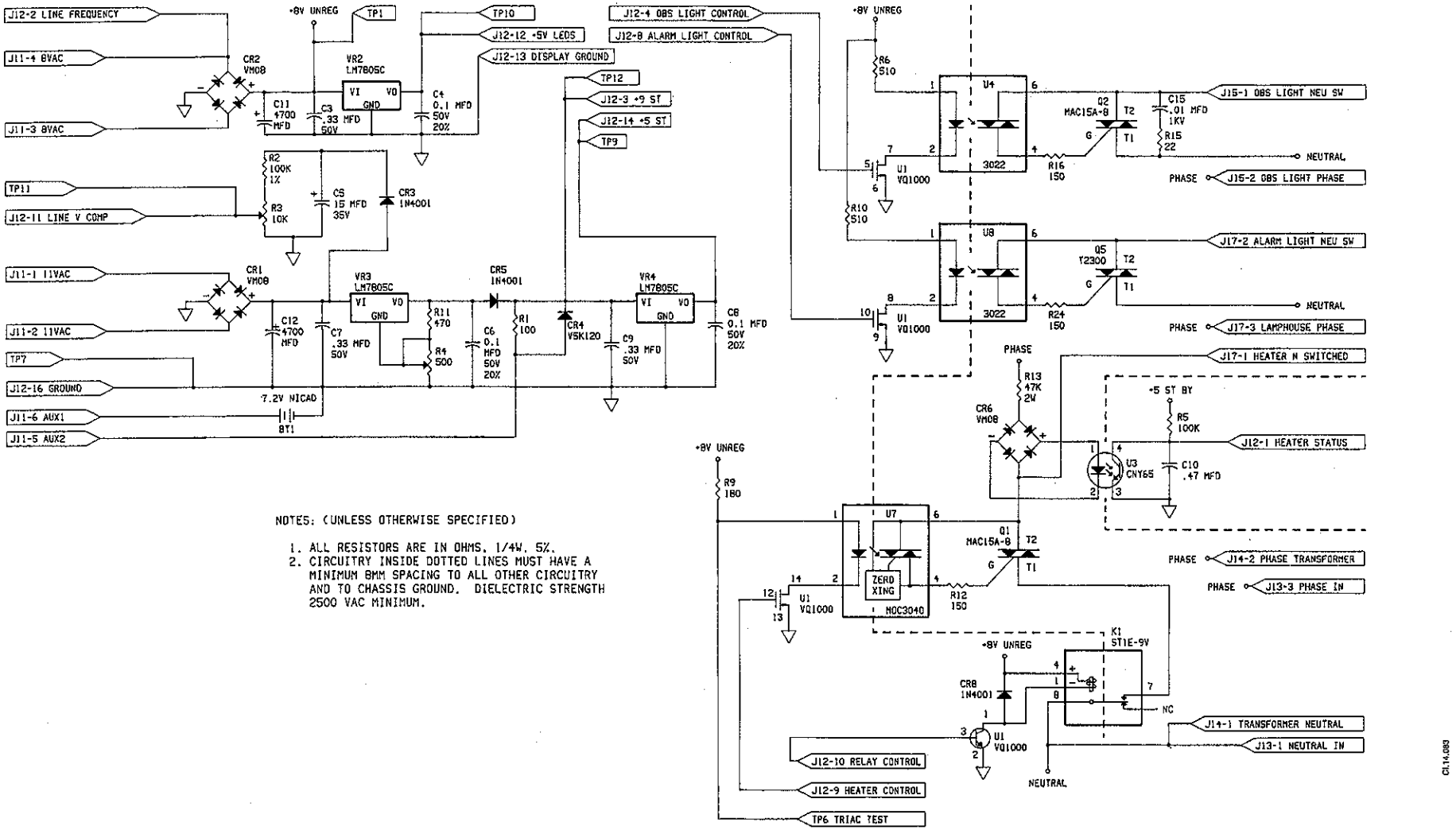


Figure 8-6
Power Supply Board Model 5000 with AAN serial number

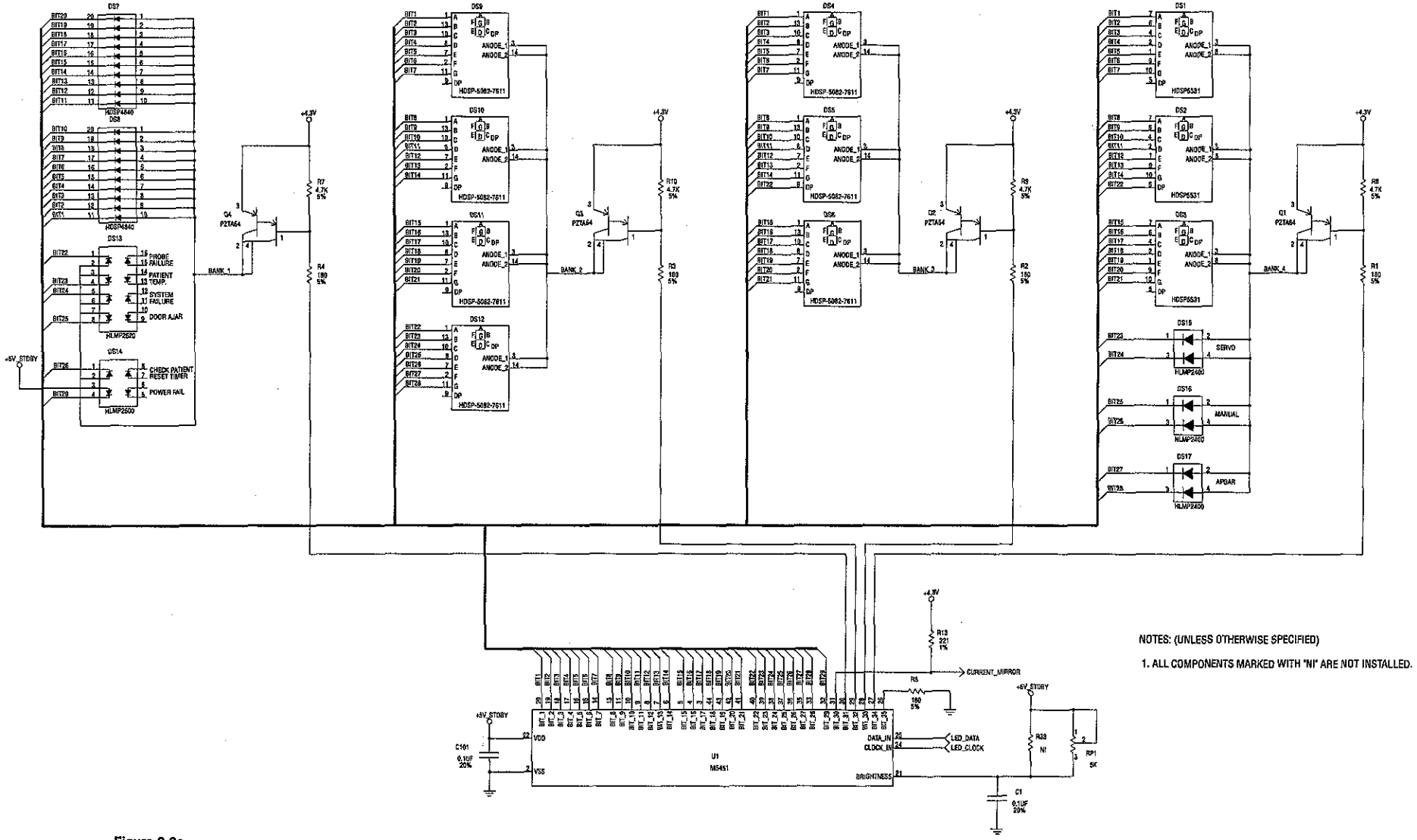


NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.
2. CIRCUITRY INSIDE DOTTED LINES MUST HAVE A MINIMUM 8MM SPACING TO ALL OTHER CIRCUITRY AND TO CHASSIS GROUND. DIELECTRIC STRENGTH 2500 VAC MINIMUM.

Figure 8-7
Power Supply Board Schematic- Model 2001 & Series 3000 with HAK, HAJ and AAN serial number

8/Schematics



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL COMPONENTS MARKED WITH "NI" ARE NOT INSTALLED.

Figure 8-8a
Schematic Display Board - Surface mounted board (SMT)

8/Schematics

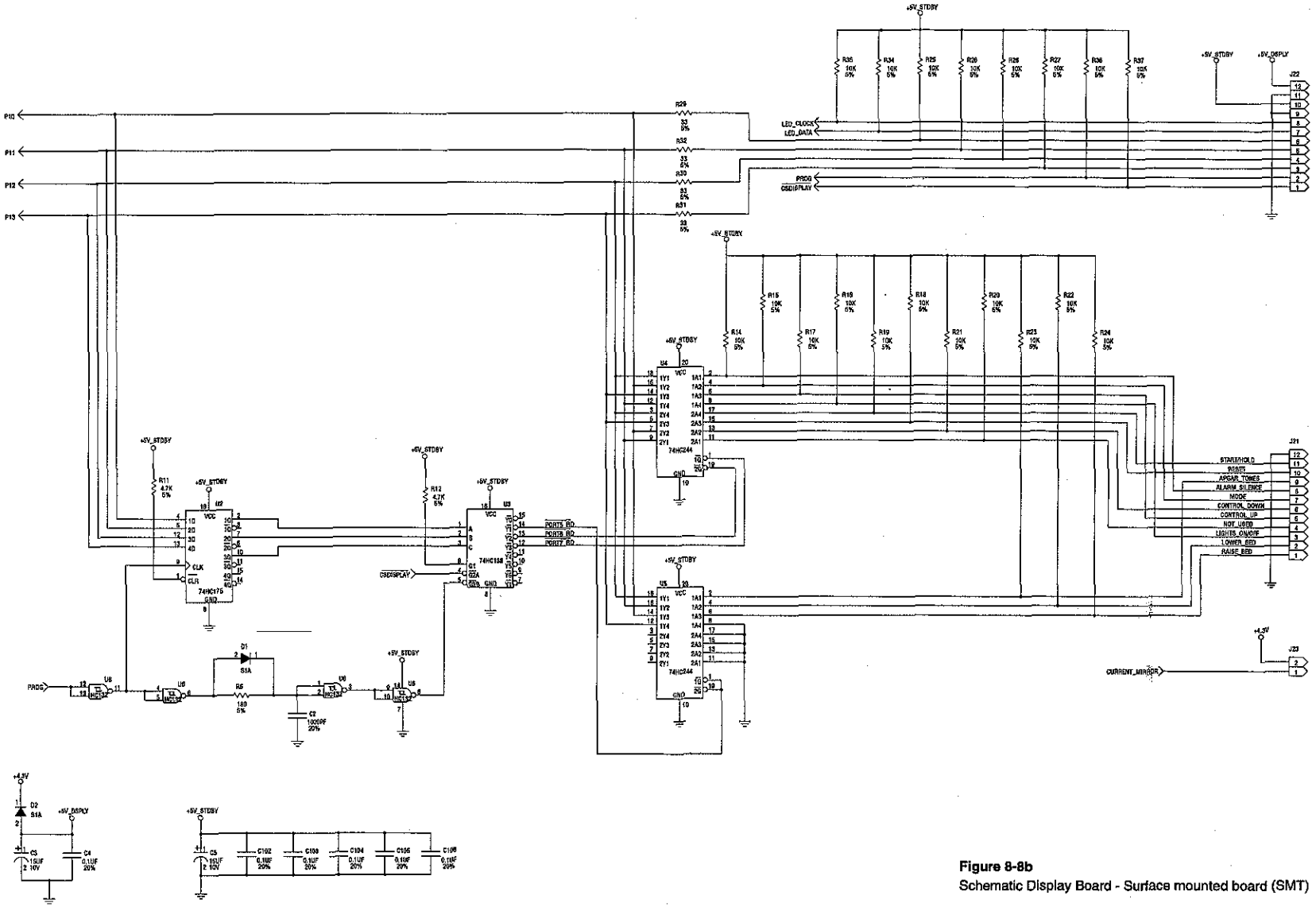


Figure 8-8b
Schematic Display Board - Surface mounted board (SMT)

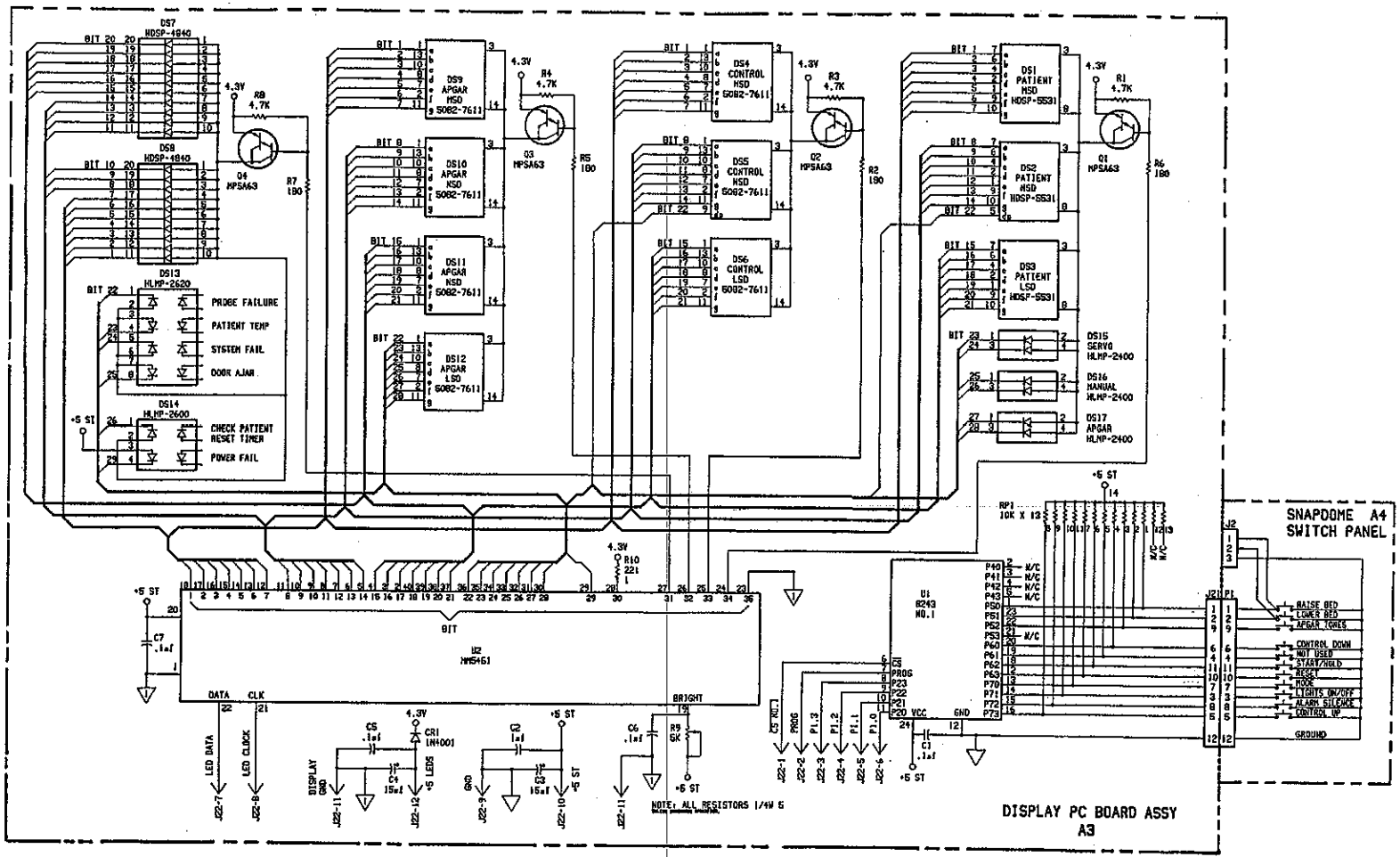
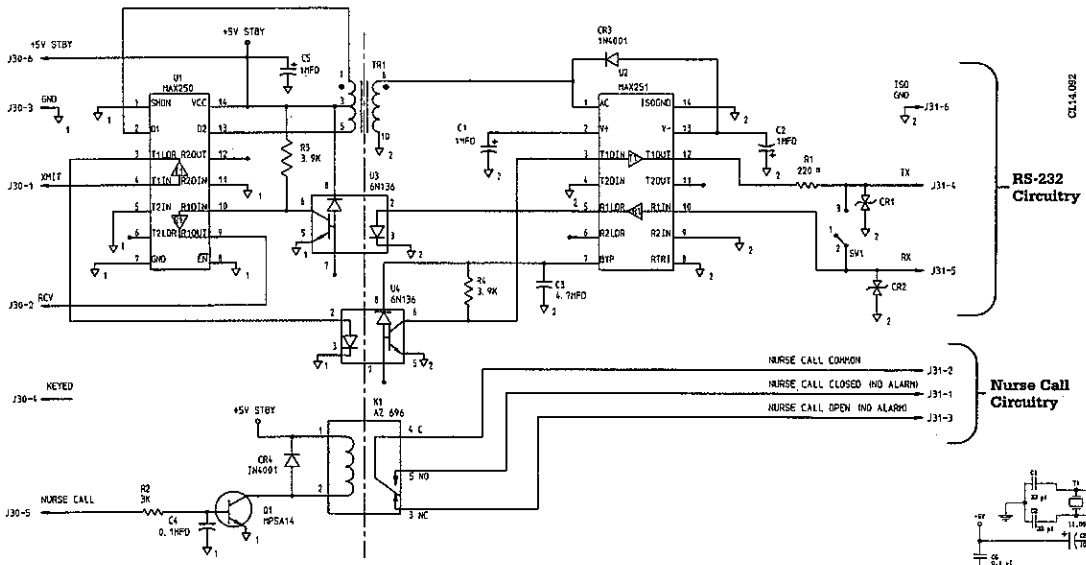


Figure 8-9
Schematic Display Board - through mount board



ThermaLink Boards with test switch

ThermaLink Boards without test switch

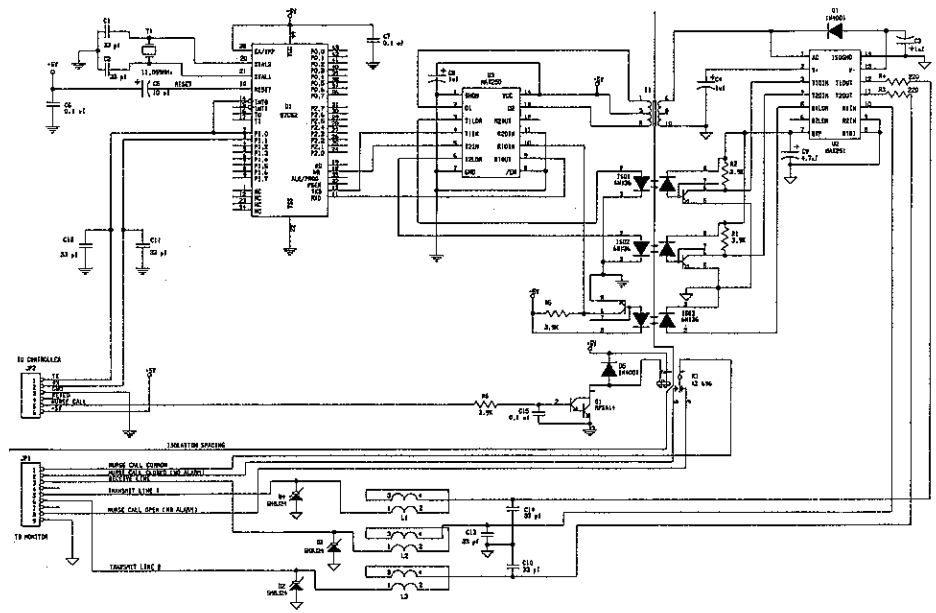


Figure 8-10
ThermaLink Schematic

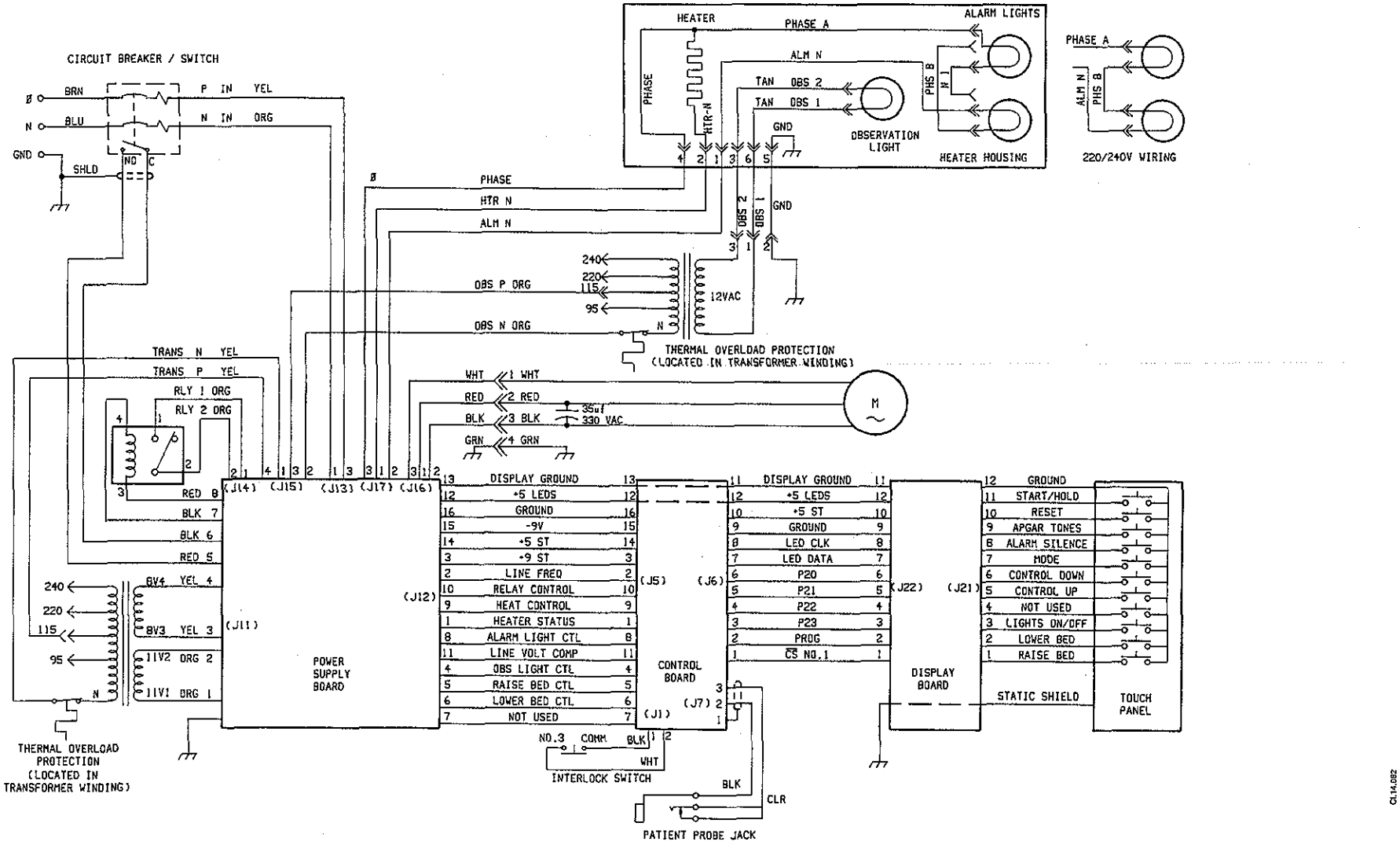


Figure 8-11
Wiring Diagram - Model 5000 with AAN serial number

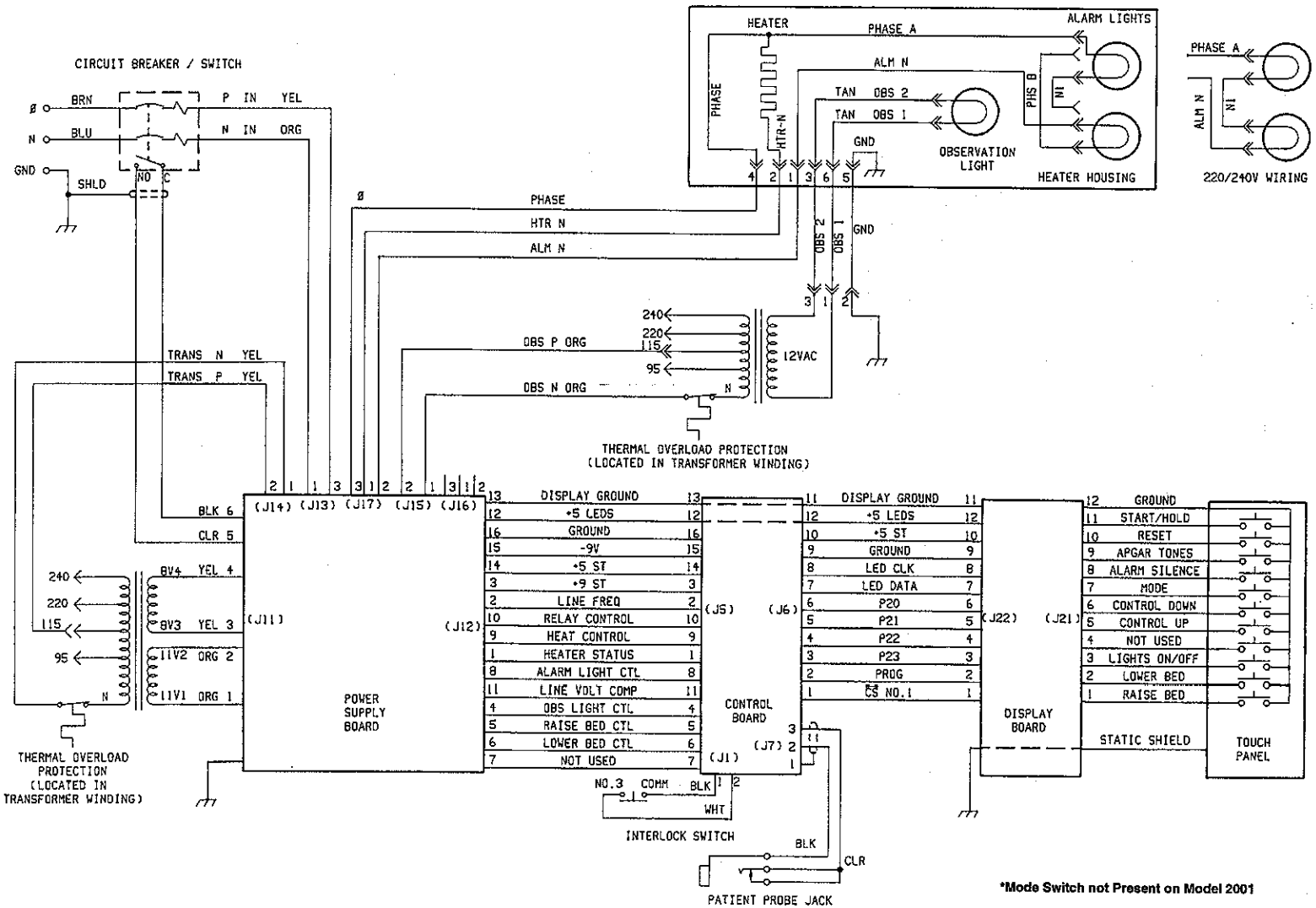


Figure 8-12
Wiring Diagram - Model 2001 and Series 3000 with HAK, HAJ and AAN serial numbers

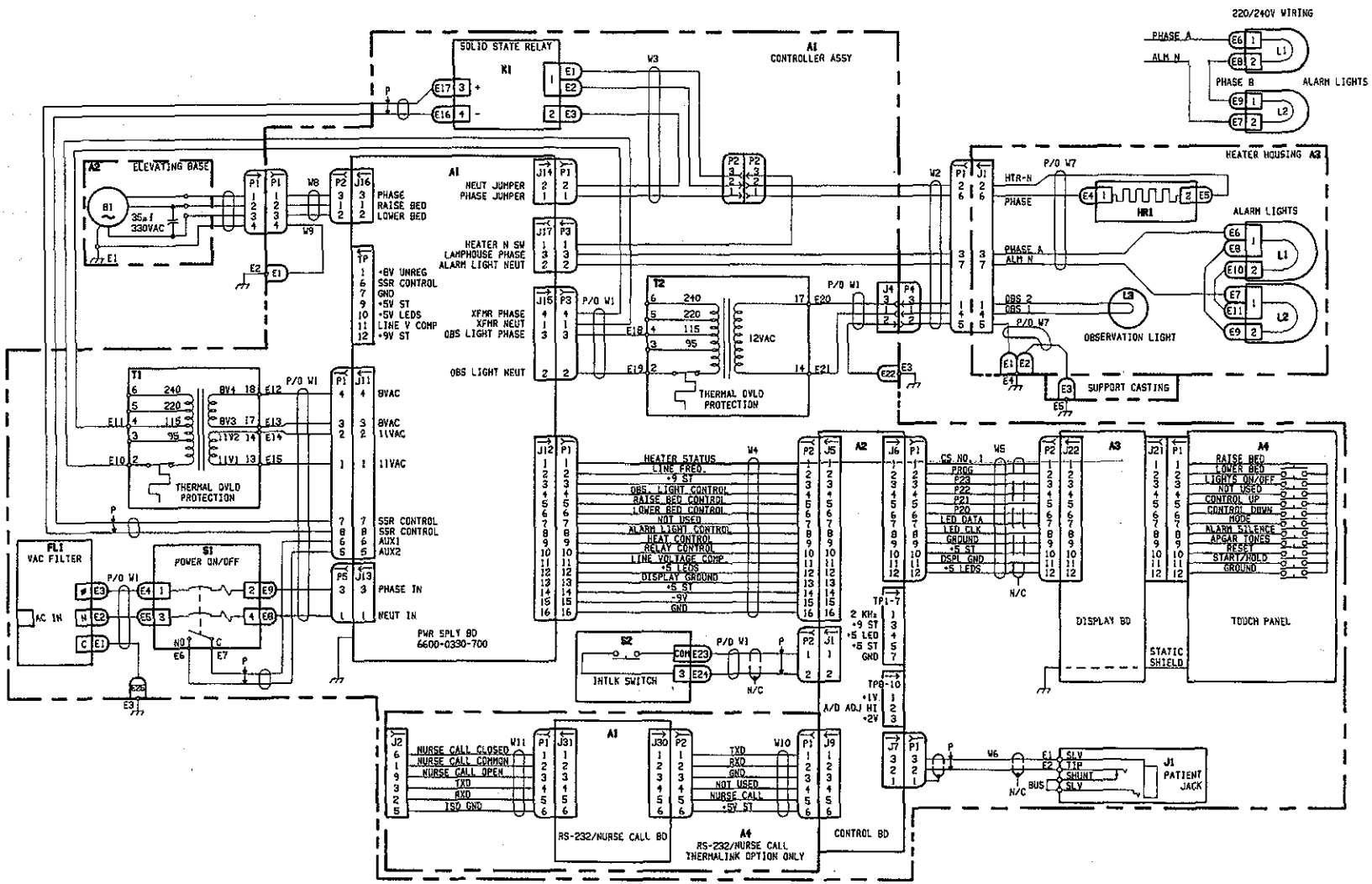


Figure 8-13
Wiring Diagram - Units with HCA serial number

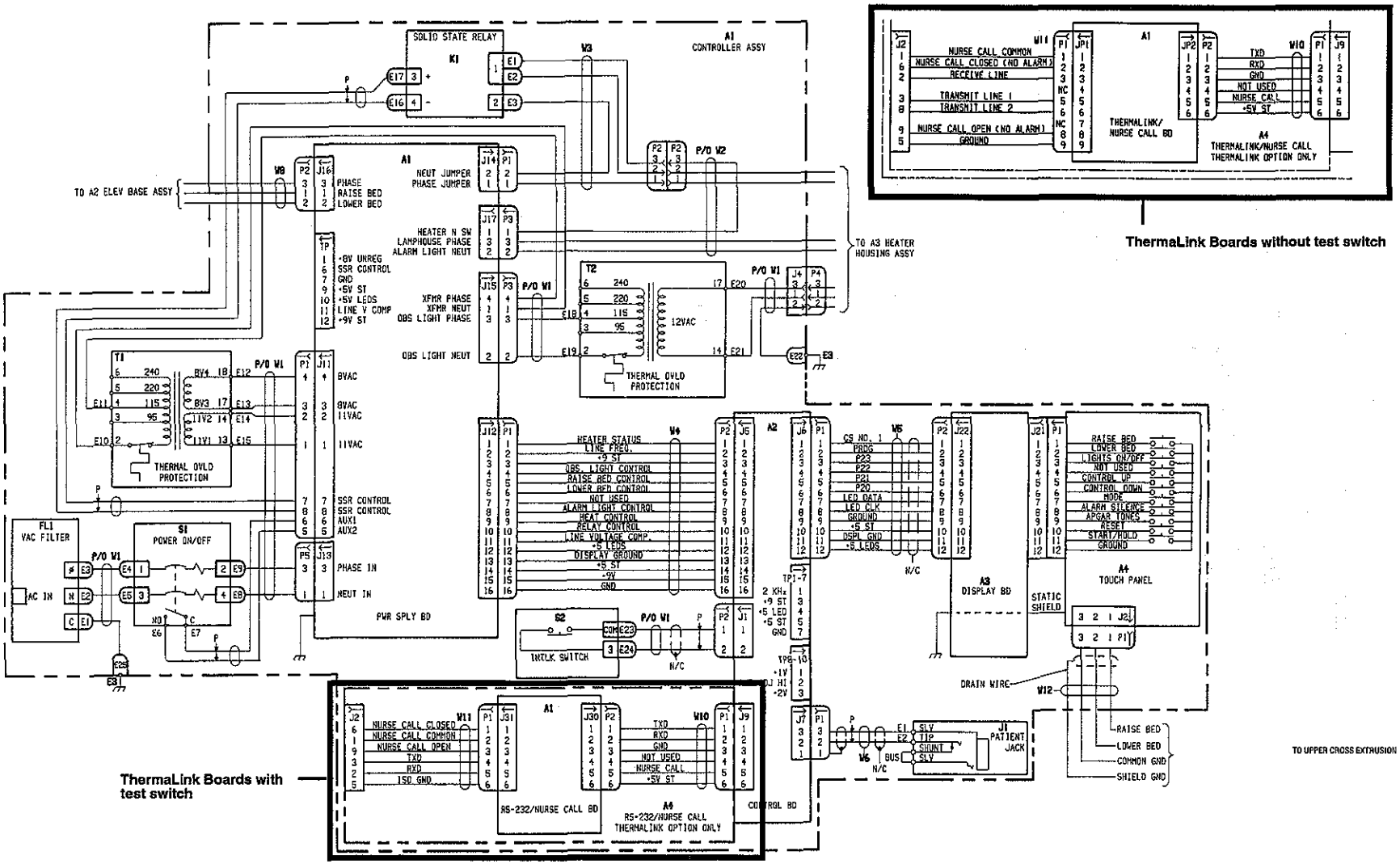


Figure 8-14a
Wiring Diagram - Type 2 Elevating models with foot switch controls — page 1

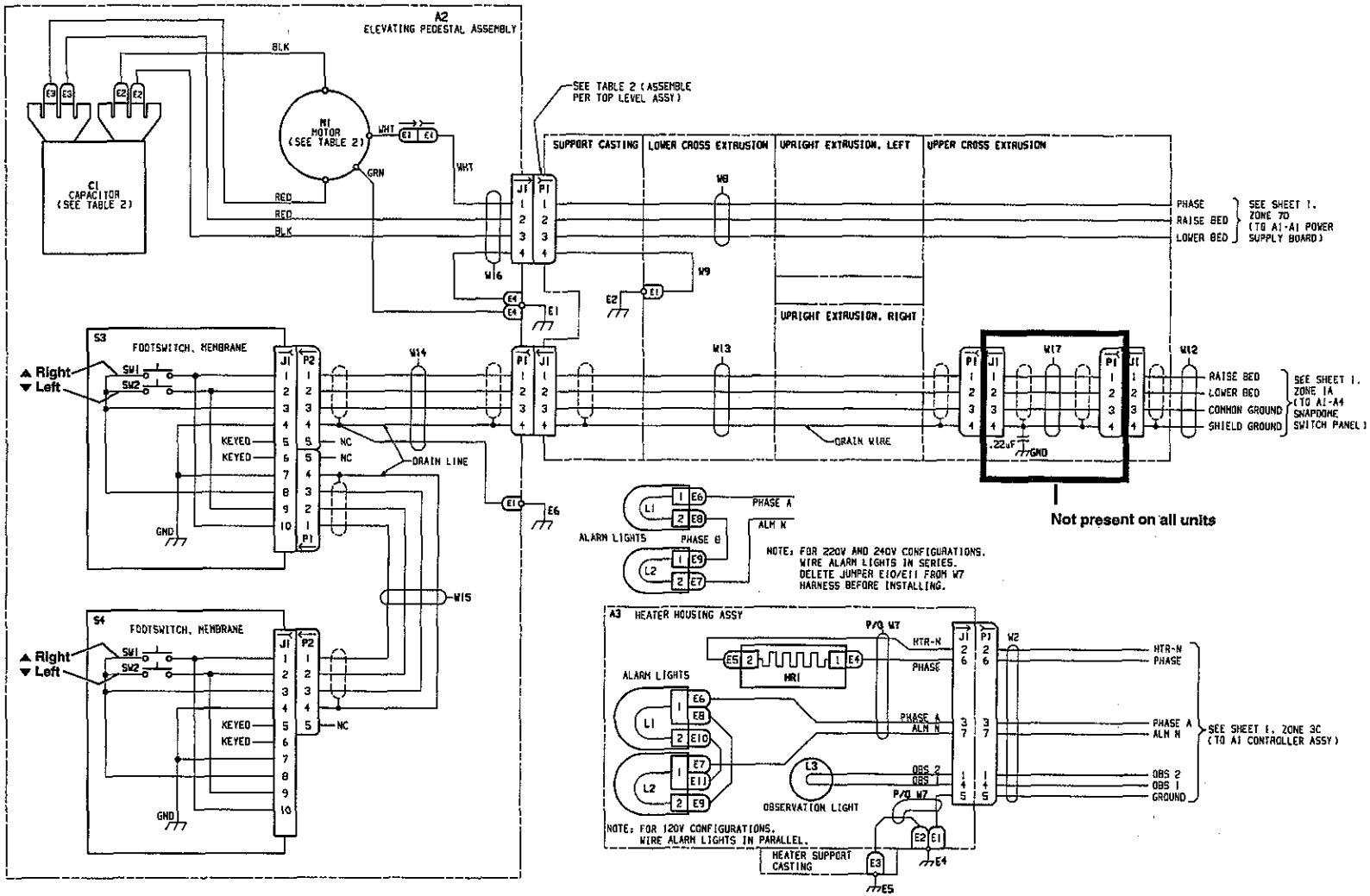


Figure 8-14b
Wiring Diagram - Type 2 Elevating models with foot switch controls — page 2

Appendix

A.1 Test Equipment and Reference Tables

A. Test Equipment and Special Tools

The following tools (or their functional equivalents) are required to complete the recommended service procedures. If you do not have these items, they can be ordered from Ohmeda.

Description	Stock Number
Digital Multimeter, 3 1/2 digit	7000-0000-023
Leakage Current Tester with AAMI Test Load	0175-2305-000
Static Control Work Station, 3M Model 8005 or Equivalent	0175-2311-000
Beige touch-up paint (Munsell No. 10Y9-1) 8 Oz.	0220-0211-300
Light grey touch-up paint (Munsel 1GY8.56-0.44 chroma)	6600-0714-200

Optional items include:

Oscilloscope, 15 MHz Dual Trace Scope	0175-2302-000
Ohmeda Temperature Simulator	0217-2788-800
DB9 Male Test Connector (Pins 2 & 3 shorted)	6050-0001-709

For units equipped with gas package only:

Yoke check valve socket	0175-0420-000
Air/O_2 Test tool	
Tee 1/8 NPT Female	6700-0134-400
Adapter 1/8 NPTM-1/8 Hose Barb	0204-8877-300
Gauge 100 PSI	0205-8201-300
Orifice .025"	7000-0000-103
1/8" Tygon Tubing	0994-6370-010
DISS HIT Oxygen	6700-0510-800
DISS HIT Air	6700-0510-803

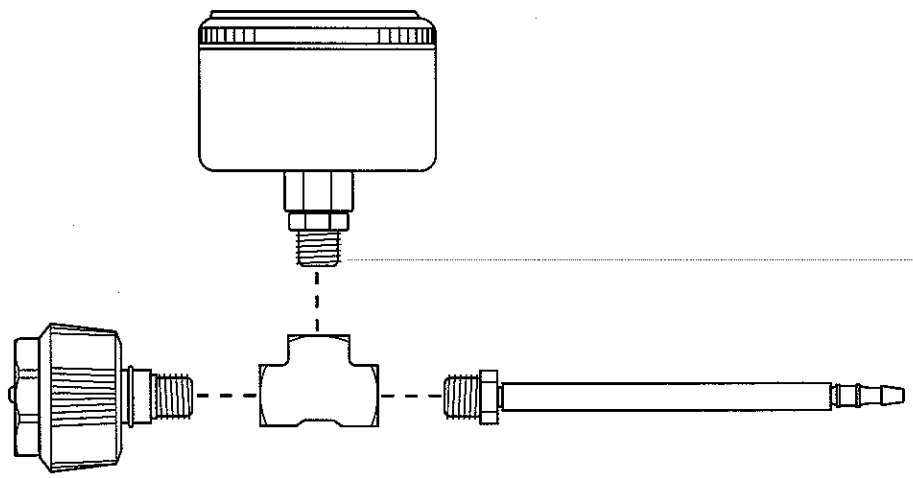


Figure A-1
Air/O_2 500 cc/min test tool

Appendix

B. Temperature Conversion Chart

°C	°F	°C	°F	°C	°F
20.0	68.0	34.5	94.1	37.6	99.7
21.5	70.7	35.0	95.0	37.7	99.9
22.0	71.6	35.1	95.2	37.8	100.0
22.5	72.5	35.2	95.4	37.9	100.2
23.0	73.4	35.3	95.4	38.0	100.4
23.5	74.3	35.4	95.7	38.1	100.6
24.0	75.2	35.5	95.9	38.2	100.8
24.5	76.1	35.6	96.1	38.3	100.9
25.0	77.0	35.7	96.3	38.4	101.1
25.5	77.9	35.8	96.4	38.5	101.3
26.0	78.8	35.9	96.6	38.6	101.5
26.5	79.7	36.0	96.8	38.7	101.7
27.0	80.6	36.1	97.0	38.8	101.8
27.5	81.5	36.2	97.2	38.9	102.0
28.0	82.4	36.3	97.3	39.0	102.2
28.5	83.3	36.4	97.5	39.5	103.1
29.0	84.2	36.5	97.7	40.0	104.0
29.5	85.1	36.6	97.9	40.5	104.9
30.0	86.0	36.7	98.1	41.0	105.8
30.5	86.9	36.8	98.2	41.5	106.7
31.0	87.8	36.9	98.4	42.0	107.6
31.5	88.7	37.0	98.6	42.5	108.5
32.0	89.6	37.1	98.8	43.0	109.4
32.5	90.5	37.2	99.0	43.5	110.3
33.0	91.4	37.3	99.1	44.0	111.2
33.5	92.3	37.4	99.3	44.5	112.1
34.0	93.2	37.5	99.5	45.0	113.0

Appendix

C. Patient Probe Characteristics

Temp °C	Res. Ohms	Temp °C	Res. Ohms	Temp °C	Res. Ohms	Temp °C	Res. Ohms
29.9	8071.2	34.0	6778.2	38.1	5716.0	42.2	4839.5
30.0	8036.5	34.1	6749.8	38.2	5692.5	42.3	4820.1
30.1	8002.0	34.2	6721.5	38.3	5669.2	42.4	4800.8
30.2	7967.6	34.3	6693.3	38.4	5646.0	42.5	4781.6
30.3	7933.4	34.4	6665.3	38.5	5622.9	42.6	4762.5
30.4	7899.4	34.5	6637.3	38.6	5599.9	42.7	4743.5
30.5	7865.6	34.6	6609.6	38.7	5577.0	42.8	4724.5
30.6	7831.9	34.7	6581.9	38.8	5554.3	42.9	4705.7
30.7	7798.3	34.8	6554.4	38.9	5531.6	43.0	4686.9
30.8	7765.0	34.9	6527.0	39.0	5509.0	43.1	4668.3
30.9	7731.7	35.0	6499.8	39.1	5486.6	43.2	4649.7
31.0	7698.7	35.1	6472.6	39.2	5464.2	43.3	4631.2
31.1	7665.8	35.2	6445.7	39.3	5441.9	43.4	4612.7
31.2	7633.1	35.3	6418.8	39.4	5419.8	43.5	4594.4
31.3	7600.5	35.4	6392.1	39.5	5397.7	43.6	4576.1
31.4	7568.1	35.5	6365.4	39.6	5375.8	43.7	4558.0
31.5	7535.9	35.6	6339.0	39.7	5354.0	43.8	4539.9
31.6	7503.8	35.7	6312.6	39.8	5332.2	43.9	4521.9
31.7	7471.8	35.8	6286.4	39.9	5310.6	44.0	4503.9
31.8	7440.0	35.9	6260.3	40.0	5289.0	44.1	4486.1
31.9	7408.4	36.0	6234.3	40.1	5267.6	44.2	4468.3
32.0	7376.9	36.1	6208.4	40.2	5246.2	44.3	4450.6
32.1	7345.6	32.2	6182.7	40.3	5225.0	44.4	4433.0
32.2	7314.4	36.3	6157.0	40.4	5203.9	44.5	4415.5
32.3	7283.4	36.4	6131.5	40.5	5182.8	44.6	4398.1
32.4	7252.5	36.5	6106.2	40.6	5161.9	44.7	4380.7
32.5	7221.8	36.6	6080.9	40.7	5141.0	44.8	4363.4
32.6	7191.2	36.7	6055.8	40.8	5120.2	44.9	4346.2
32.7	7160.8	36.8	6030.7	40.9	5099.6	45.0	4329.1
32.8	7130.5	36.9	6005.8	41.0	5079.0		
32.9	7100.4	37.0	5981.1	41.1	5058.5		
33.0	7070.4	37.1	5956.4	41.2	5038.2		
33.1	7040.5	37.2	5931.8	41.3	5017.9		
33.2	7010.8	37.3	5907.4	41.4	4997.7		
33.3	6981.3	37.4	5883.1	41.5	4977.6		
33.4	6951.8	37.5	5858.9	41.6	4957.6		
33.5	6922.6	37.6	5834.8	41.7	4937.7		
33.6	6893.4	37.7	5810.8	41.8	4917.9		
33.7	6864.4	37.8	5786.9	41.9	4898.1		
33.8	6835.5	37.9	5763.1	42.0	4878.5		
33.9	6806.8	38.0	5739.5	42.1	4858.9		

D. Servo Mode Algorithm

The servo mode uses the difference between the servo mode control temperature and the patient skin temperature to determine the percent of heater power required:

Control Temp – Patient Temp			Percent Heater Power
0.45°C			100
0.44	to	0.30°C	95
0.29	to	0.25°C	90
0.24	to	0.20°C	85
0.19	to	0.15°C	75
0.14	to	0.10°C	65
0.09	to	0.05°C	45
0.04	to	–0.04°C	25
–0.05	to	–0.09°C	20
–0.10	to	–0.14°C	15
–0.15	to	–0.19°C	10
–0.20	to	–0.24°C	5
–0.25°C			0

A.2 Infant Warmer System Specifications

A. Electrical specifications

Power requirements

Units with HCA or HCC serial numbers
120 V, 50/60 Hz Model: 115 V~ ± 10%, 6.6 Amps.- maximum
220 V, 50/60 Hz Model: 220V~ ± 10%, 3.7 Amps.- maximum
230 V, 50/60 Hz Model: 230V~ ± 10%, - 6%, 3.4 Amps.- maximum
240 V, 50/60 Hz Model: 240 V~ ± 10%, 3.3 Amps.- maximum
100 V, 50/60 Hz Model: 95 V~ ± 10%, 8.2 Amps.- maximum

Units with AAN, HAJ or HAK serial numbers
120 V, 50/60 Hz Model: 115 V~ ± 10%, 5.7 Amps.- maximum
220 V, 50/60 Hz Model: 220V~ ± 10%, 3.0 Amps.- maximum
240 V, 50/60 Hz Model: 240 V~ ± 10%, 2.7 Amps.- maximum
100 V, 50/60 Hz Model: 95 V~ ± 10%, 6.4 Amps.- maximum

All models designed to conform to IEC 601-1, UL544, CSA 22.5, SEMKO and TUV requirements.

Line voltage compensation

Input line voltage is monitored and the heater drive is adjusted to compensate for variations in the line voltage. This ensures a stable heater output despite input line voltage fluctuations.

Circuit breaker

Rated Current: 7.5 Amps.
Trip Point: 9.45 Amp Minimum.
Type: Manual Resetting.
Model: Airpax Snapak.

Isolation voltage

2500 Vrms 60 Hz from the patient probe to the ac phase and neutral lines for one minute.

WARNING ⚠ **The patient probe is not isolated from earth ground. Any additional equipment used with the Ohmeda Infant Warmer System must comply with UL 544, CSA 22.2, IEC 601, and VDE 750.**

Leakage current

UL544:	When measured at an exposed metal surface with the ground wire open, the leakage current should be less than 300 micro amperes on 100V and 120V, 50/60 Hz units
CSA 22.2 M125:	When measured at an exposed metal surface with the ground wire open, the leakage current should be less than 100 micro amperes on 100V and 120V, 50/60 Hz units
IEC 601-1:	When measured at an exposed metal surface with the ground wire open, the leakage current should be less than 500 micro amperes on 220V, 230V and 240V, 50/60 Hz units

Ground resistance

0.1 ohms or less. Less than 0.2 ohms when measured from the power cord ground pin to an exposed metal surface.

B. IEC 601-1 Specifications

Type of protection against electric shock:	Class 1
Degree of protection against electric shock:	Type B
Mode of Operation:	Continuous
Protection against hazards of explosion:	Not Protected
Protection against ingress of liquids:	Not Protected

C. Performance Specifications

Controller electronics

Microprocessor-based control system. Self-test functions are performed at power up and during normal operation.

Power control method

Proportional heat control with zero-voltage switching to minimize radiated and conducted EMI.

Observation light

Nominal illuminance output: 100 foot candles at center of mattress.

Estimated lamp life: 3,000 hours.

Patient temperature measurement range

Range displayed: +22 to 42°C

Accuracy: ±3°C within a range of 30-42°C

Resolution: ±0.1°C

Probe interchangeability: ±0.1°C

Probe Model Number: LA003 or LA005

Elapsed timer

60 minute elapsed timer with hold mode and Apgar tones.

Manual mode heat selector range

All HCA and HCC units and Model 5000: 0 to 540 watts in 20 increments of 5% each.

Models without HCA or HCC serial numbers: 0 to 440 in 20 increments of 5% each.

Servo mode control range

35.0 to 37.5°C in increments of 0.1°C (all models except the 2001 international)

Alarms

Multiple audio tones:	Operator prompt tone.
	Alternating single tone.
	Alternating two tone.

Overhead Alarm Light

Large alarm light located on the front of the heater assembly for easy visual identification.

Probe Failure Alarm

The alternating two tone alarm is active only in the servo mode. Activates when the skin temperature probe:

1. Fails electrically due to an open or short circuit, or
2. Is disconnected from the Warmer.
3. Probe senses temperature outside the 01 - 50° C range.

When this alarm condition exists:

1. The heater is turned off and
2. The patient temperature display flashes "HH.H" or "LL.L".

Note: Temperature is only displayed in the 22.0 - 41.9° C range inclusive. In both the servo and manual modes, temperatures below 22.0° C display "LL.L", and temperature above 41.9° C display "HH.H". Temperatures above 50° C cause a blank display in the manual mode. Temperatures below 01° C display "HH.H" in the servo mode.

Patient Temperature Alarm

This single tone alarm activates in the servo mode when the difference between the patient temperature and the control temperature is greater than 1°C (can be adjusted to 0.5°C by qualified service person). Alarm cancels when the patient temperature returns to within 0.8°C of the control temperature.

System Failure Alarm

This alternating, two tone alarm cannot be silenced. Alarm activates and turns the heater off if any of the following occurs:

1. The analog-to-digital converter calibration drifts by more than 0.3°C.
2. The heater solid state relay fails.
3. The microprocessor fails -
4. The self check functions fail on power-up.

Note: Excessive EMI in the hospital environment can trigger the system failure alarm. Note the error code, if any, and switch off the unit. Wait ten seconds and switch the power back on. If the system fail alarm recurs, remove the warmer from use.

Check Patient Alarm

Manual Mode: Single tone alarm activates if the heater has been energized at greater than 25% heat for 12 continuous minutes.

Servo mode: Alarm activates when the heater has been at full power for 12 continuous minutes. Alternating two tone alarm activates after 3 minutes if the Check Patient Alarm is not silenced.

Power Failure Alarm

Single tone alarm activates if the line power is interrupted. On unit with HCC serial numbers, the Power Failure LED illuminates. A rechargeable maintenance-free nickel cadmium battery powers the audio alarm and the microprocessor for up to 10 minutes with a fully charged battery. If power is restored within 10 minutes, the mode of operation and the set point are recalled.

Heat Off Alarm

The Light-Emitting-Diode (LED) indicator activates when the heater is in the side position. The audio alarm activates after the heater has been in the side position for 5 minutes.

D. Environmental

Temperature range

Operating Temperature range: 10 to 40°C (50 to 104° F)

Transport and Storage Temperature range: -25 to 60°C (-13 to 140° F)

Operating and Storage Pressure range: 500 to 1060 hPa

Operating and Storage Relative Humidity range: 0 to 95%.

E. Electromagnetic Compatibility (EMC) Specifications

All models meet the requirements as specified in IEC 601-1-2
Collateral Standard Electromagnetic Compatibility - Requirements and Tests.

F. Mechanical Specifications

Overall dimensions without accessories

Model number	Height in./cm	Depth in./cm	Width in./cm	Max.Wt** lbs/kg
2001	73/185	41/104	26/66	210/96
3000	73/185	45/114	26/66	165/75
3050	11/28*	33/84	18/46	40/18
3100	60/152*	33/84	21.5/55	75/34
3150	60/152*	36/91	21.5/55	110/50
3300	73/185	41/104	26/66	210/96
3400	72-80/183-203	45/114	30.5/77	200/91
3500†	73/185	40.5/103	24.5/62	228/102
4000	73/185	52/132	30.5/77	175/80
4300	73/185	45/114	30.5/77	222/101
4400	72-80/183-203	45/114	30.5/77	200/91
5000	72-80/183-203	45/114	32/81	210/96

* Height of equipment itself, height from floor will vary on application.

† Includes bassinet.

**Units without drawers: for units with stationary drawers add 56 lbs (25 kg), for units with rotating drawers add 70 lbs (32 kg).

Mattress dimensions

Model number	Width in./cm	Length in./cm
2001	18.2/46	25.2/64
3000	—	—
3050	—	—
3100	—	—
3150	18.2/46	25.2/64
3300	18.2/46	25.2/64
3400	18.2/47	25.2/64
3500	18.2/46	25.2/64
4000	—	—
4300	23.2/59	29.2/74
4400	23.2/59	29.2/74
5000	23.2/59	29.2/74

Appendix

Casters

Model number	
2001	5" (13cm) dia., 2 locking, 2 non locking
3000	5" (13cm) dia., 2 locking, 2 non locking
3050	—
3100	—
3150	—
3300	5" (13cm) dia., 2 locking, 2 non locking
3400	5" (13 cm) dia., 2 locking, 2 non locking
3500	Warmer- 2" dia., 2 (5cm)locking, 4 non locking Bassinet -5" (13cm) dia., 2 locking, 2 non locking
4000	5" (13cm) dia., 2 locking, 2 non locking
4300	5" (13cm) dia., 2 locking, 2 non locking
4400	5" (13cm) dia., 2 locking, 2 non locking
5000	5" (13cm) dia., 2 locking, 2 non locking

Drawers†

Model number	
2001	3 drawers- 15" x 15.5" x 4" (39 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (39 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (39 x 39 x 23 cm)
3000	—
3050	—
3100	—
3150	3 drawers- 15" x 15.5" x 4" (38 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (38 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (38 x 39 x 23 cm)
3300	3 drawers- 15" x 15.5" x 4" (38 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (38 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (38 x 39 x 23 cm)
3400	3 drawers- 15" x 15.5" x 4" (38 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (38 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (38 x 39 x 23 cm)
3500	1 drawer- 12" x 15" x 3" (30 x 39 x 8 cm) 2 drawers - 12" x 15" x 3" (39 x 39 x 15 cm
4000	—
4300	3 drawers- 15" x 15.5" x 4" (38 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (38 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (38 x 39 x 23 cm)
4400	3 drawers- 15" x 15.5" x 4" (38 x 39 x 10 cm) or 1 drawer 15" x 15.5" x 4" (38 x 39 x 10 cm), 1 drawer 15" x 15.5" x 9" (38 x 39 x 23 cm)

†Dimensions for both the stationary and rotating drawer packages are the same.

Bed tilt positions

3500: ± 8° in increments of 4°

All other models: ± 10° continuously adjustable

Bed duty cycle (Elevating models only)

Type 1
20 seconds on
15 minutes off
Type 2
1 minute on
10 minutes off

3500 Bassinet

Bed height: 40.5 in (103 cm)
Material: Select oak and oak veneer. Optional custom stain colors are available.
Storage: Three Drawer storage opening from either side or the front of the unit, depending on the model ordered.

Accessories

Air/Oxygen Yoke and Regulator
Pin indexed oxygen yokes accommodate two E size oxygen cylinders.
Additional yoke accommodates one E-size cylinder of compressed air.
Air and oxygen pipeline fittings.
Regulators: 52 ± 2 psig (at cylinder pressure of 1500 psig)
(358 ± 14 kPa) (4 bar ± 138 millibar in the U.K.).
Cylinder pressure gauges: 0 to 3000 psig (0 to 20700 kPa)

Oxygen Yoke and Regulator
Pin indexed yokes accommodate two E size oxygen cylinders.
Oxygen pipeline fittings.
Regulator: 52 ± 2 psig (at cylinder pressure of 1500 psig)
(358 ± 14 kPa) (4 bar ± 138 millibar in the U.K.).
Cylinder pressure gauge: 0 to 3000 psig (0 to 20700 kPa)

Rail Mounted Accessories

WARNINGS

⚠ **Overloading the shelves can affect the stability of the unit. Limit the load to 20 lbs. (9 kg) per instrument shelf, mounted to a single upright, and 50 lbs. (23 kg) per monitor shelf, mounted between the uprights.**

⚠ **Limit the load of accessories to 50 pounds (23 kg) per side on the Warmer to ensure stability. Accessories should not be mounted more than 56 inches (142 cm) above the floor. For models 3000 and 3500, limit the load of accessories to 20 pounds (9 kg) per side mounted no more than 44 inches (112 cm) above the floor.**

⚠ **Due to the increased height of units with the ECMO option installed, a tipping hazard may exist. Limit the total accessory load to 50 lbs. (23 kg), no more than 25 lbs. (11 kg) per side.**

System 2001/3000/3300/4000 Monitor Shelf
Dimensions 12 x 26 inches (30 x 66 cm)
Load limit: 50 lbs (22 kg)

System 5000 Monitor Shelf
Dimensions 12 x 30.5 inches (30 x 77 cm)
Load Limit: 50 lbs (22 kg)

Instrument shelf
Dimensions 12 x 12 inches (30 x 30 cm)
Load limit: 20 lbs (9kg)
Oxygen flowmeter with DISS fittings: 0 to 15 LPM
Air flowmeter with DISS fittings: 0 to 15 LPM
Airway Manometer: -20 to +100 centimeters of water

IV pole

Gas manifold with 1/8 inch NPT fitting

3.5 inch utility post

Utility Post, 22 Inch (0217-5376-800) 1 inch diameter x 22 inch long post

Provides a rigid vertical mounting space for stack mounting of equipment. The post should be mounted as low as possible to ensure the stability of the Warmer.

Vacuum Manifold with DISS Adapters

Two DISS vacuum adapters are mounted on a standard manifold block. The locations of these adapters can be changed to any of the other tapped holes in the block to meet special requirements.

Vacuum Bottle Slide Bracket

The standard vacuum bottle slide can be mounted on either upright.

Ventilator Mounting Post

The vertical mounting post is a non-locking 1 inch diameter shaft which pivots in an 8.5 inch radius from the upright. One end of the shaft extends 14 inches while the other extends 6.5 inches. Ventilators, humidifiers, blenders or other user hardware can be pivoted into optional position.

G. Heater Specifications

Heater Output

All models with HCA and HCC serial numbers:
540 watts ± 5% at maximum % power setting.
Average Energy at Mattress Level at maximum % power setting:
34 mW/cm^2 for Model 2001 and Series 3000 with HCA and HCC serial number
20 mW/cm^2 for Model 2001 and Series 3000 with AAN serial number
22 mW/cm^2 for Model 2001 and Series 3000 with HAK and AAN serial number

Recommended Bed Level

27 ± 2 inches (69 ± 5cm) from bottom of heater grill.

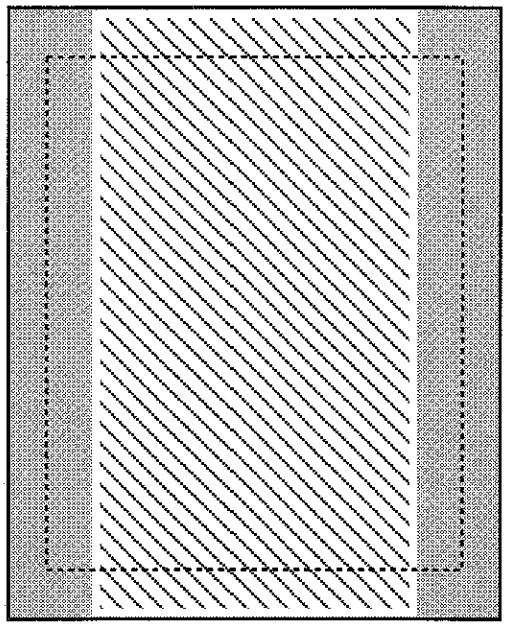
WARNING ⚠ **Bed-to-heater spacing which differs from the specified 27 ± 2 inches (69± 5cm) will result in incorrect operation and may affect the patient's condition.**

Appendix

Radiant Energy Distribution

This table lists typical average radiant energy distribution across the patient bed surface for informational purposes only.

Typical Radiant Energy Level on the Mattress Surface



Infant Zone ,15" (38cm) wide

Mattress- Model 2001/Series 3000

Mattress- Model 5000/Series 4000

	mW/cm^2	
	Zone Average	**Mattress Average**
Model 2001 and Series 3000 units†	34	34
Model 5000 and Series 4000 units	22	20

† The radiant energy values of older models will be 24 zone average and 22 mattress average: units prior to those with HCA and HCC serial numbers had a 440 Watt heater.

A.3 ThermaLink Option Specifications

A. Hewlett Packard CMS Monitor (Vuelink)

The warmer may be connected to a Hewlett Packard CMS Monitor via a Vuelink open interface module (HP P/N M1032A Option A05) and Ohmeda option cable . The parameters passed to the HP monitor are: patient temperature, set temperature, and heater power level; these three parameters are displayed by default on power-up. The user can select to display any or all of these parameters. All alarms are also passed to the monitor. See the Hewlett Packard CMS and Vuelink manuals for features and functions of the HP system.

B. SpaceLabs Monitor (Flexport)

The warmer may be connected to a SpaceLabs Bedside Monitor via a Flexport (SL P/N 90444A). The parameters passed to the SpaceLabs Bedside Monitor are: patient temperature, set temperature, and heater power level. All alarms are also passed to the monitor. See the SpaceLabs Monitor and Flexport manuals for features and functions of the SL system

C. Serial data

WARNING ⚠ **The computer or RS-232 monitor's user program must continuously check the data link. The program should constantly verify connection to the warmer controller and check for updated data.**

Note: In the event of power failure, all serial communication will cease until power is restored.

RS-232 Connector

The Nurse Call and the serial data output share the same female, nine pin, d-type connector (DB9F).

Pin 2: Receive Data (warmer input)

Pin 3: Transmit Data (warmer output)

Pin 5: Gnd (Signal Ground)

Cable requirements

The user interface cable must have capacitance less than 1500 pF. It should be a shielded cable such as a Belden 9611 with AMP shielding kit 748046-1 and ferrule 747579-8.

Data transmission

The warmer continuously sends data from the time that it is first powered up. Note that the warmer serial data transmission can be controlled through the serial port. Data output stops when the warmer receives a <cntrl>S (XOFF) and resumes when it receives a <cntrl>Q (XON).

Data format

1 start bit, 7 data bits (ASCII), 1 parity bit (odd), 1 stop bit, 1200 baud, full duplex.

Serial data has the format: start text character, "<stx>"; IWS header, "IW"; software version; data string; checksum characters; carriage return, "<cr>"; line feed, "<lf>"; end of text character, "<etx>". Data elements are separated by spaces, "_". Each String contains 53 characters:

Sample data:

<stx>IW0500_35.52_XX.XX_P_00085_36.50_00001000_E014_11<cr><lf><etx>

Data for discussion (use the following table):
<stx>IWxxxx_pt.pt_xx.xx_m_ppppp_pc.pc_alrmleds_code_ck<cr><lf><etx>

<stx>

Start of text character (ASCII 2) or CTRL B; indicates a string of data will follow.

IWxxxx

IW means the data is from the Infant Warmer; xxxx is the software version in the unit, e.g. 0500 for version 5.00.

pt.pt

This is the patient temperature in degrees centigrade. The patient temperature will always be sent even if it is outside the normal display range. Temperatures less than or equal to 1.00°C indicate an open or a disconnected probe. Any temperature greater than or equal to 50°C is a shorted probe.

xx.xx

Reserved for future use.

m

This is the mode of operation. P means servo control mode. A means manual control mode. Always check the mode of operation before evaluating the patient control temperatures.

ppppp

Percentage of nominal power defined as % of heater wattage.

pc.pc

In the servo control mode, this is the patient control temperature set with the ▲ and ▼ switches in degrees centigrade.

alrmleds

This series of bits represents the alarm LEDs. If an LED is illuminated, the corresponding bit is set to 1 (alarm active). If there is no alarm, the bit is set to 0. Audible alarm status bit is 1 if an alarm condition exists and if the alarm is not silenced. Audible alarm status bit is 0 if there are no active alarms, or if the active alarms are silenced.

00000100

_____ Probe Failure Alarm

_____ Patient Temperature Alarm

_____ System Failure Alarm

_____ Heat Off Alarm

_____ Check Patient Alarm

_____ Reserved

_____ Power Failure Alarm

_____ Audible Alarm Status Bit

code

This is the error code that appears in the control temperature display during a system failure alarm (e.g. E014). If the system is operating normally (no system failure), zeroes replace the error code (e.g. E000).

ck

This is the two byte ASCII representation of the byte that when added to the sum of all the ASCII data bytes in the string equals zero. Note that all over flows are dropped and the sum of the data bytes DOES NOT INCLUDE the <stx>, checksum, <etx>, <cr>, or <lf> characters or the parity bit of each byte.

<cr>

Carriage return character.

<lf>

Line feed character.

<etx>

End of transmission character (ASCII 3) or CTRL B.

D. Nurse Call specifications

Contact ratings

Maximum resistive load: 4 VA
Maximum DC switching voltage: 100 Vdc
Maximum switching current: 0.25 A
Maximum carrying current: 0.50 A.

Connector

The Nurse Call contacts and the serial data output share the same female, nine pin, d-type connector (DB9F).

Pin 6: Closed contact under normal conditions, i.e. power on, no alarm (recommended configuration)
Pin 1: Common contact
Pin 9: Open contact under normal conditions, power on, no alarm

These contacts are not powered. They only provide closure.

Table A-1
Nurse Call signals

Warmer Status	Nurse Call Signal Pins 1&6	Pins 1&9
Normal	Closed	Open
Alarm	Open	Closed
Power switch off or power fails	Open	Closed
Nurse Call cable disconnected	Open	Open

WARNING ⚠ **If you use the normally open Nurse call connection, a disconnected Nurse Call cable DOES NOT trigger a remote alarm.**

Note: Any interruption of warmer power (deliberately switching off the warmer , accidentally unplugging the power cord, etc.) triggers a Nurse Call alarm.

A.4 Accessory Service Procedures

A. Disassembling and servicing rotating drawer package

(see Figure 7-26 for part numbers)

WARNING ⚠ **On Model 3300 and 4400 warmers factory equipped with drawers, if the drawers are removed and not re-installed, a leg weight must be installed in the right leg of the unit to ensure the stability before the warmer can be placed in service.**

1. Remove the drawers from the cabinet by extending the drawer slides and unlatching them from the drawers. Return the slides to the closed position.
2. Place a two by four or some other suitable support across the warmer base legs under the drawer package to sustain the weight of the drawer assembly (approximately 70 lbs).
3. Access to the drawer cabinet mounting screws is different depending on which model you are servicing:
   A. On large bed units (series 4000 & 5000), rotate the drawers to the front of the warmer to locate the screws that secure the cabinet to the bed support casting. Two screws are located inside the drawer cabinet, accessible through 3/4" dia. holes in the cabinet top. Two are located in back of the cabinet.

B. On standard bed units (series 3000 & 2001), rotate the drawers to the right side of the warmer to remove the screws that secure the cabinet to the bed support casting. All four screws are located inside the cabinet, accessible through 3/4" dia. holes in the cabinet top.

4. Remove the Phillips head screws (located in step 3) that mount the drawer assembly to the warmer. Move the drawer assembly clear of the warmer.

5. On large bed units you must remove two additional mounting screws. To access the mounting screws, turn the drawer cabinet over, so that the top sits flat on the floor. Rotate the cabinet 90° counterclockwise. Remove the mounting screws.

6. Remove the drawer shelf from the top plate.

7. Inspect the operation of the detents and bearings by rotating the upper plate.

8. To disassemble the upper plate remove the cotter pin, slotted nut and 1/2-13 carriage bolt.

9. Inspect the large plastic bearing, internal cam in the rotation cover, and the function of the sliding cam follower. Replace any worn or broken parts.

10. Lubricate the large plastic bearing and sliding cam follower with Lubriplate (0220-5150-300).

11. Re-install the upper plate with the cotter pin, slotted nut and 1/2-13 carriage bolt removed earlier. After tightening the slotted nut to remove all slack, tighten it an additional 3/4 turn and install the cotter pin.

12. Complete re-assembly by reversing steps 1 through 7.

B. Installing the X-ray tray

(See Section 7 for part numbers)

Installing Slides

1. Insert a slide (long side down) into the large slot under the bed, then push the slide, threaded studs first, against the forward edge of the bed cavity. The studs should then straddle the diagonal ribs under the bed.

2. Slip a shoulder washer over each of the two threaded studs, (see detail) then screw on the threaded knobs, clamping the slide to the diagonal rib.

3. Repeat above steps for installation of the second slide in the rear.

4. Slip the X-ray tray into the slides under the bed.

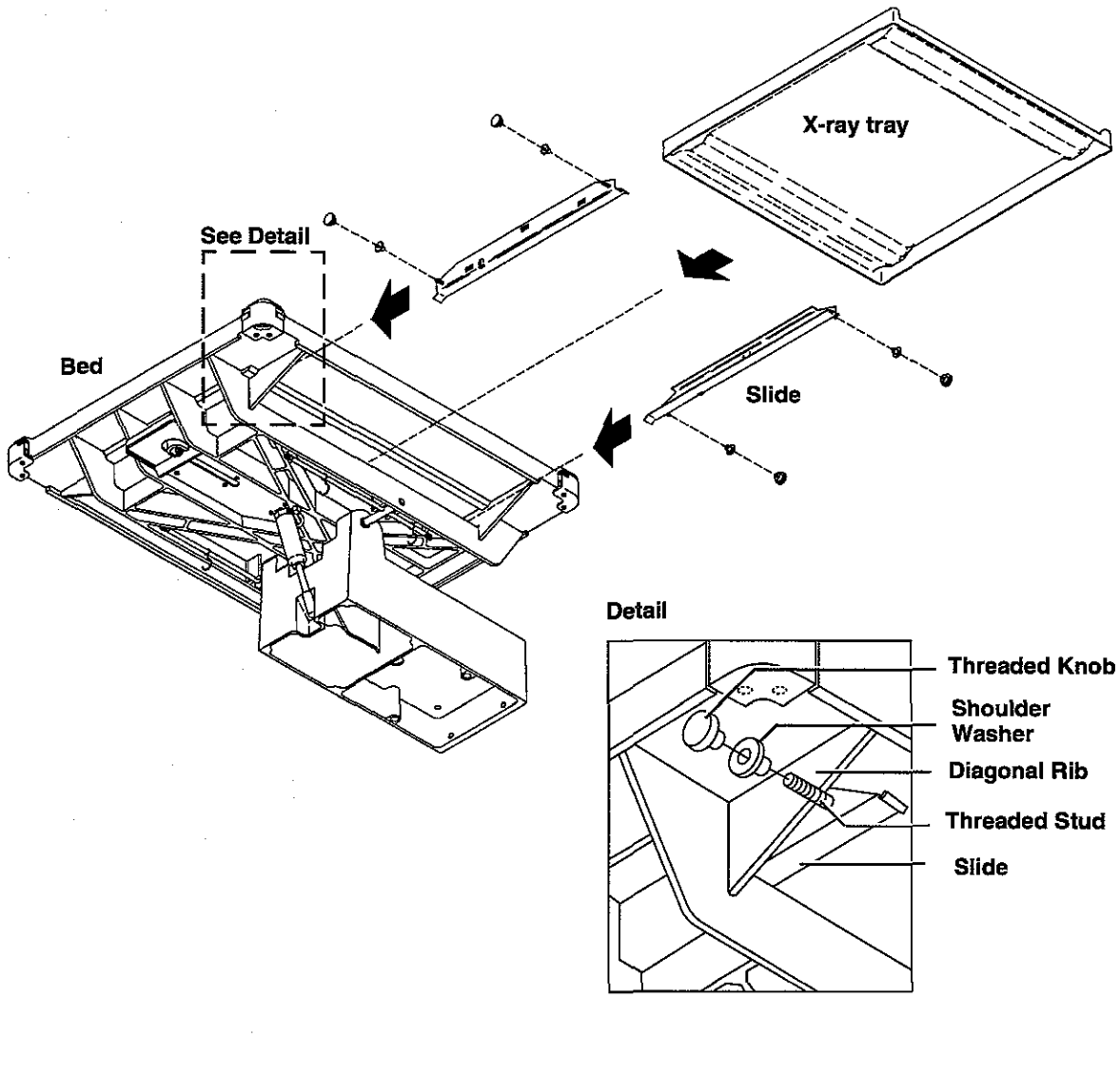


Figure A-1
Tray installation

Installing Side Panel Decals

1. Before installing the decals, remove the bed side panels and thoroughly clean according to the cleaning recommendations in section 4 of the Infant Warmer System Operation and Maintenance manual.

   Note: Be sure to apply Short Decals only to Short Panels, and Long Decals only to Long Panels.

2. The decals are sandwiched between a Backer and a Front Liner (see Figure A-6). Peel the first long decal, using the Front Liner, away from the Backer, being careful not to allow decal to fold onto itself.

   Note: leave the decal adhered to the back of the Front Liner at this time.

3. Place the first long side panel so that the side WITHOUT an edge bevel on the acrylic faces you (so the decal mounts on the non-beveled side, see Figure A-6). Align left edge and bottom of decal front liner with left edge and bottom of acrylic panel. Keep bottom straight while pressing down remainder of decal working from left to right to remove all air bubbles.

4. With the front liner still applied, rub entire decal down firmly with a smooth tool to ensure good adhesion.

5. SLOWLY Peel off front liner and discard. Repeat steps for remaining three panels. Replace panels onto warmer bed.

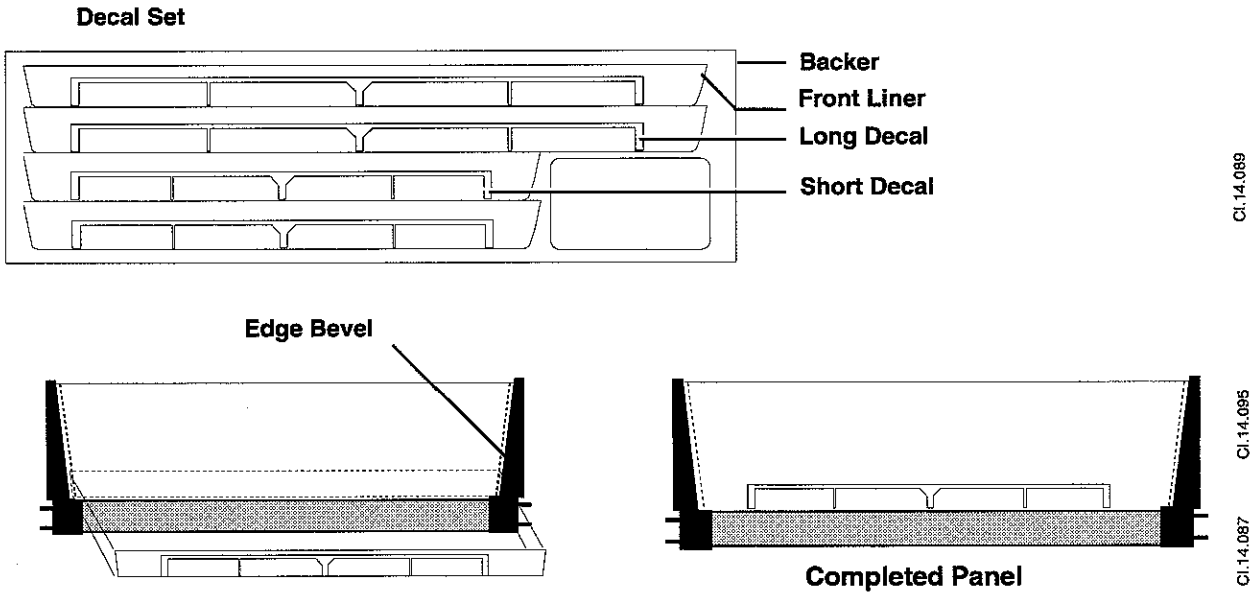
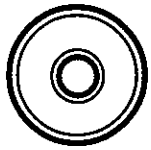
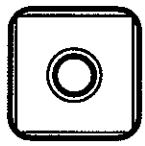


Figure A-2
Bed panel decals

C. Bearing replacment on Type 1 Elevating Units



OEM Bearing (1.43" dia.)



Replacement Bearing (1.40" sq. x 156" thk.)

Figure A-3
Bearings

Note: The replacement bearings in kit (6600-0069-850) are not interchangeable with the square bearings in newer Type 2 elevating units.

Typical symptoms indicating a need for service to the column bearings include:

- The column moves with quick, abrupt motions rather than smooth even travel.
- The column moves with vibration.
- There is excessive column tilting.

Raise the elevating column to the maximum height. Follow the instructions in section 5 for removing the bed and heater assembly from the IWS.

(See Figure A-4)

1. Remove the upper bolt which attaches the flange to the top of the actuator.

   Note: There is an external tooth lock washer between the head of the bolt and the upper flange. There is also another lock washer, on the same bolt, under the flange between the top of the actuator and the flange.

2. Remove the connector and strain relief from the coiled power cord.

   To release the pins push a small screw driver down either side of the pins to push in the pin tabs (or use pin extraction tool, AMP PN 458994-2), then grasp the wire and pull the pins out of the other end of the connector.

   To re-assemble the connector the pin numbers are marked on the back of the plastic connector:

   1= white 3 = black

   2 = red 4 = green

   To release the strain relief squeeze it with pliers and pull it up out of the flange ground wire.

3. Pull the inner column to separate it from the assembly. If the column proves too difficult to remove by pulling, use the spring spreaders (6600-0650-400) to release the bearing pressure. Insert a spreader between each of the four sets of blocks and springs located inside the column.

3. Remove the inner column.
4. Remove the spring spreaders.

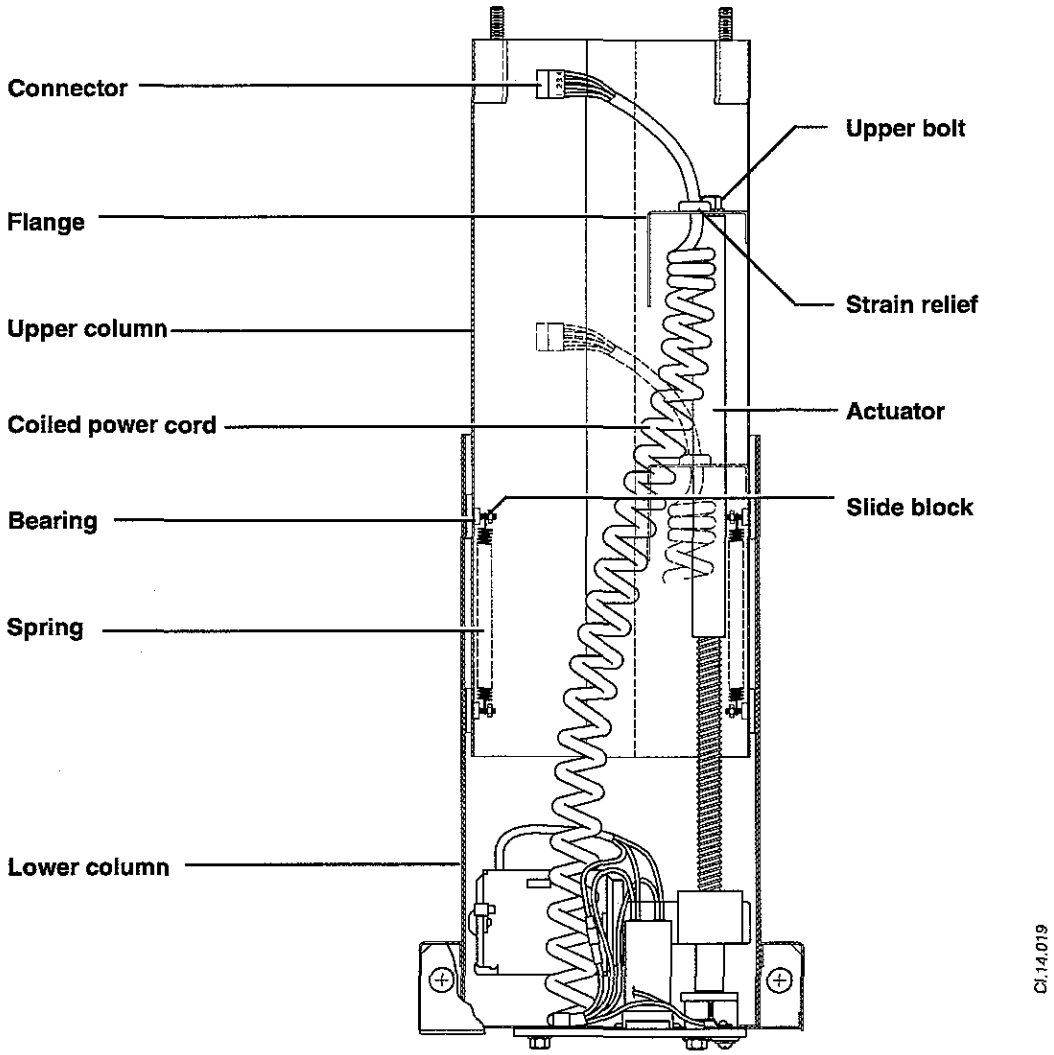


Figure A-4
Column Cut-away Type 1 unit

5. Wipe away any old grease from the channels.
6. Use a 3/8" nut driver to remove the nuts holding the springs onto the screws.
7. Remove the springs.
8. Remove the bearing assembly screws. It will be necessary to heat the slide blocks with the heat gun or torch to soften the thread locking agent. Try to turn the screw periodically while heating it to determine when the thread locking agent has been sufficiently softened. The screw will turn easily once sufficient heat has been applied. Be careful not to shear the screw by applying too much torque.

9. Repeat the procedure for all eight bearing assemblies.
10. Discard the old bearings.
11. Re-install the bearing assemblies using the square replacement bearings.
12. Apply a drop of #242 Loctite (0220-5017-300) about .25 inches down from the head of the screw before installing.
13. Re-connect the springs.
14. Apply a drop of #242 Loctite to the end of the screw and install the spring retaining nut.
15. Apply lubriplate grease (6600-0095-300) liberally to the plastic bearings, slide block, angled slots and channels.
16. Install the spring spreaders between each of the four bearing pairs.
17. Insert the inner column into the assembly.
18. Install the bolt to attach the flange to the upper end of the actuator.

    Note: Make sure you re-install both the lock washer between the head of the bolt and the top of the flange, and the one under the flange between the top of the actuator and the flange.
19. Remove the spreaders.
20. Re- connect coiled power cord.
21. Perform electrical safety section 4 and checkout procedures in section 2.

A.5 Installing wall mounted units

WARNING ⚠ **Carefully follow these installation instructions. Failure to do so may result in serious injury to the operator or patient.**

The model 3050, 3100, and 3150 wall mounted warmers were designed for locations where permanent, infant radiant warmers attached directly to the room wall are desired. To adequately install these models, pre-planning at the architectural design phase is required.

The following instructions describe the manufacturer's recommended method of installation in new construction. Use only the Ohmeda hardware provided to mount the model 3050, 3100, and 3150. The installation should be approved by the appropriate State and Local authorities. Deviation from these recommendations or attempts to retrofit existing construction should only be undertaken by professionals experienced in structural design, who in turn are wholly responsible for the structural integrity of the mounting method they devise.

Pre-Installation Preparation

A pattern of two (2) Extra Duty Drywall Studs (STE-20 gage) and one (1) 4" x 1-1/2" (10 x 4 cm) Drywall Track (16 gage) at 16 inch (41 cm) centers form the basic "rough in" for installing each IWS 3050 unit. See Figure A-5. Verify that the studs and track are securely fastened together at 12 inch intervals and to both the floor and ceiling tracks with #10 sheet metal screws.

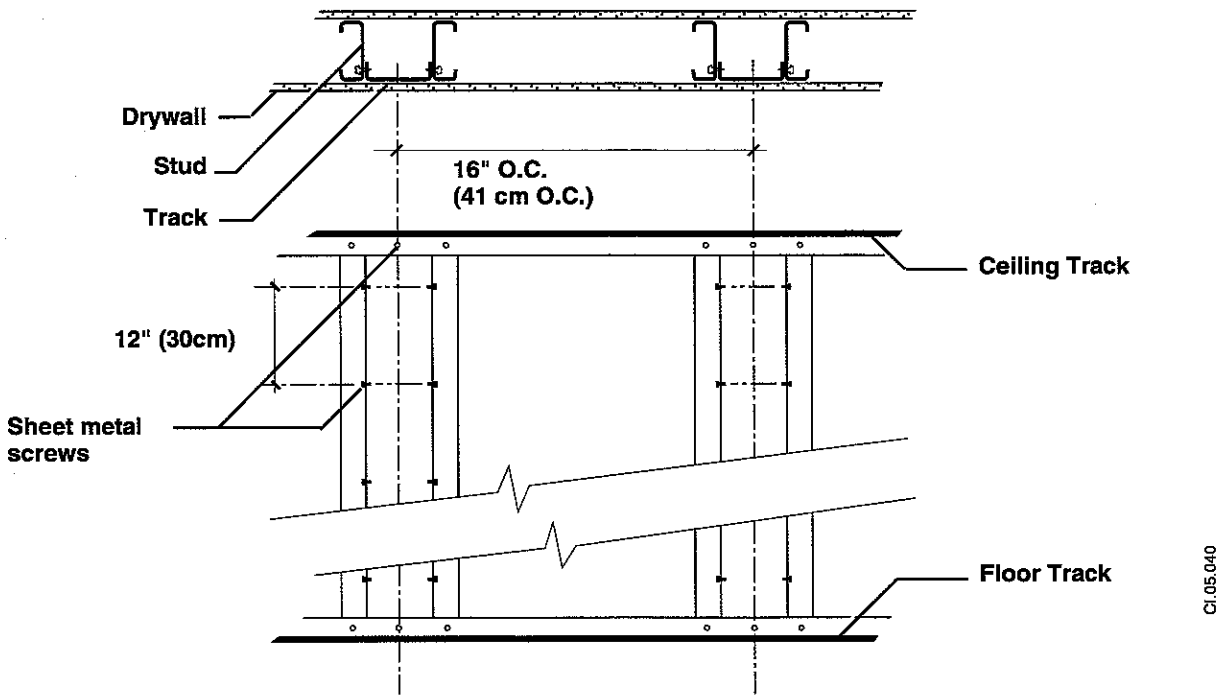


Figure A-5
Wall Cross Section

Warmer Installation

After the wall is finished and the room is completed you are ready to install the warmer. The distance from the warmer heater head to the bassinet or bed mattress surface is critical for proper operation of the warmer. This distance must be 27 inches, ± 2 inches (69 ± 5cm). Before installing the model 3050 or 3100, you must determine the bed surface height that will be used (for your convenience, a bed height label is provided to attach to the wall to aid in visually aligning the bassinet/bed surface).

1. Locate the stud edges by pre-measurement or by using a stud finder. Find the center of the drywall track 3-3/8 inches (86mm) over from the stud edge. See Figure A-6.

2. Remove the hinge bracket from the warmer by removing the (2) hinge pins (one on either side) that secure the bracket to the warmer heater head.

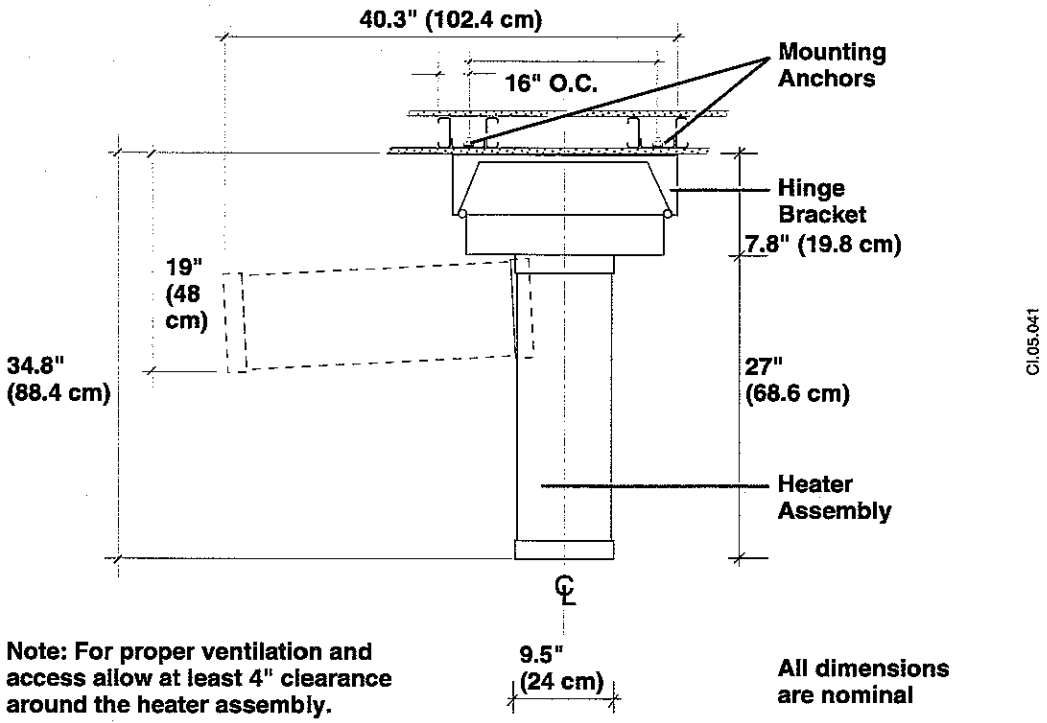


Figure A-6
Over head view

3. Utilizing a level, position the hinge bracket on the wall. The bottom edge of the heater mounting bracket on the model 3050 and 3100 must be 27 ± 2 inches (69 ±5cm) from the bed surface of the mattress that will be used. See Figure A-7. The model 3150 integral bed warmer already comes with 27 ± 2 inch (69± 5cm) bed-to-heater spacing.

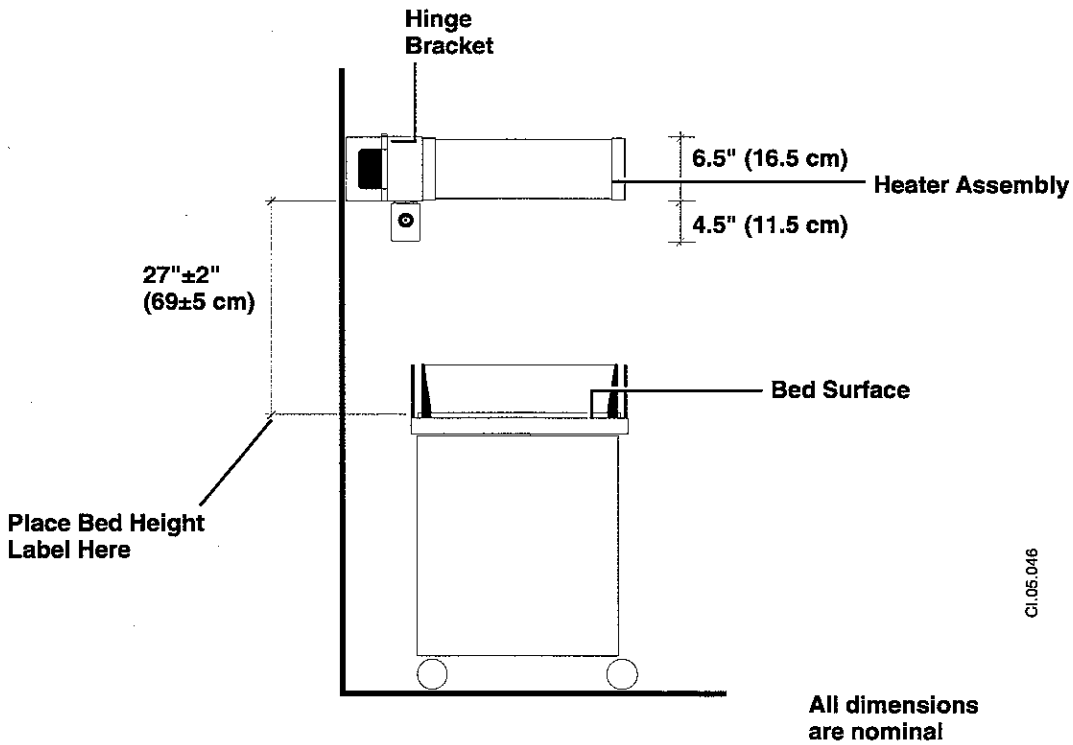


Figure A-7
Heater to bed spacing

4. Use the hinge bracket as a template to mark the mounting holes on the wall.

5. Use a 3/4 inch (19mm) diameter metal cutting hole saw to drill (4) holes through the dry wall and through metal drywall tracks behind the wall.

WARNINGS

⚠ **When installing wall mounted units, to achieve adequate structural strength all four holes must engage tracks. Should the hole saw miss a track do not proceed. Consult the project engineer for further direction.**

⚠ **Enclosing the heater assembly inside a cabinet may prevent proper ventilation and may create a fire hazard. If the heater is enclosed in a cabinet, it must be equipped with a power cut-off device that prevents operation while the cabinet is closed.**

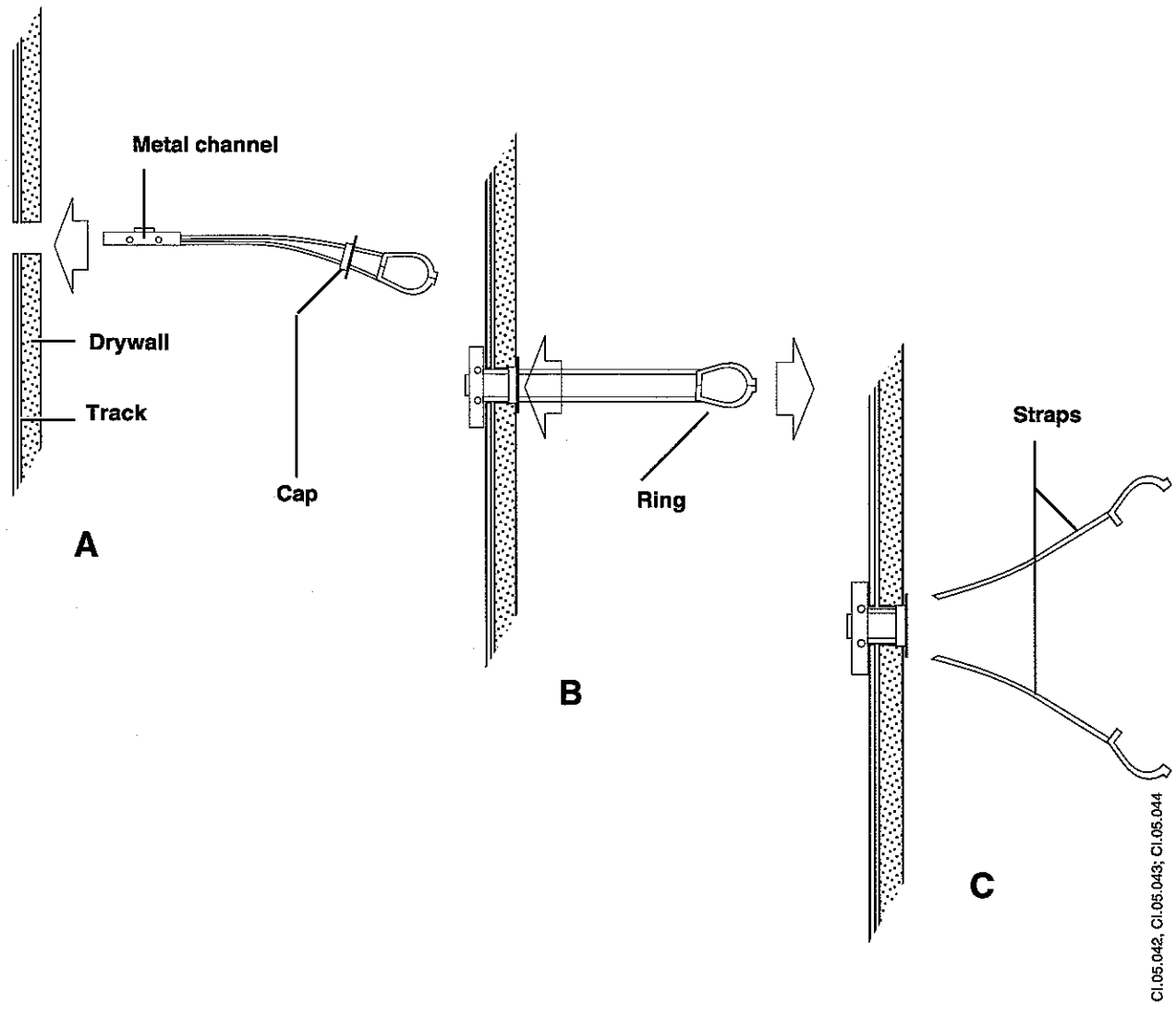


Figure A-8
Anchor installation

6. Perform steps A through C to secure the (4) Toggler® anchor bolts in the wall. See Figure A-8.
   A. Hold the metal channel flat alongside the plastic straps and slide the channel through the hole in the wall and track.
   B. With one hand, hold the ring so the metal channel rests flush behind the wall. Slide the plastic cap along straps with the other hand until the flange of the cap is flush with the wall.
   C. Place your thumb between the straps, and push from side to side, snapping off the straps level with the flange of the cap.
7. Mount the hinge bracket on the wall with the flat washers, split ring washers and screws provided. See Figure A-9. Tighten the screws with approximately 80 lb/in of torque.

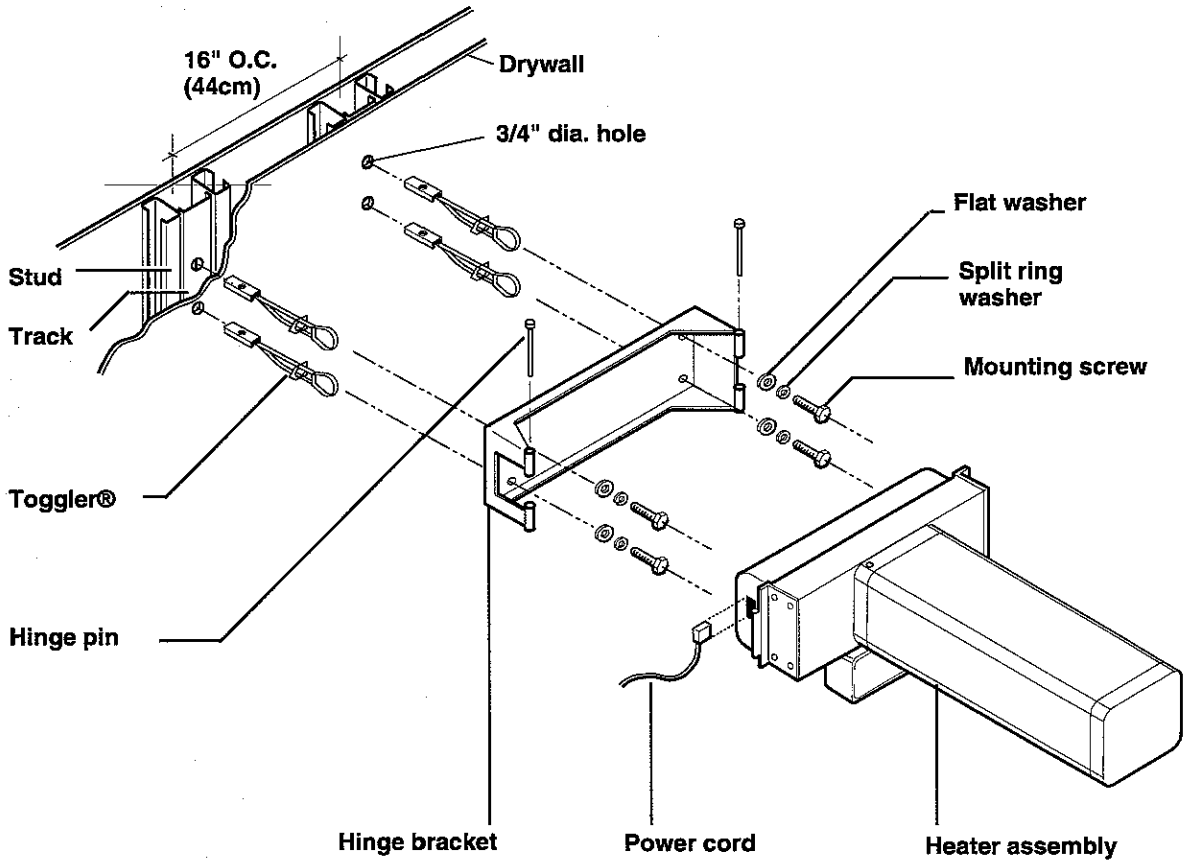


Figure A-9
Wall mounting

Note: The screws provided (3/8 - 16 UNC, 2 1/2" long) are for installations in 1/2 inch or 5/8 inch thick drywall. For applications involving double thicknesses of drywall, longer screws will be required. To properly mount the warmer, at least 2 a screw threads must be engaged.

Verify that the bracket is level and the distance to the bed surface is 27 inches, ± 2 inches (69 ± 5cm).

WARNING

⚠ **Keep hands clear of the hinge area when installing a wall mounted heater assembly. A possible pinch hazard exists .**

⚠ **The 3050 heater assembly weighs approximately 30 lbs (14 kg). Proper installation may require two people. Due to the weight of the 3100 and 3150, the 3100 weighs approximately 75 lbs. (34 kg) and the 3150 weighs approximately 110 lbs. (50 kg), proper installation will require two people.**

---

8. Mount the warmer by inserting the back of the unit into the hinge bracket mounted on the wall, then securing it by tapping in the (2) hinge pins. Verify that the heater assembly is rigidly secured to the wall, is level, and is parallel to the floor.
9. For the model 3050 and 3100, attach the "proper bed to heater spacing" label provided with the unit to the wall so that the bottom line of the label is 29 inches (74 cm) from the lower edge of the hinge bracket.

WARNING

⚠ **On units shipped prior to 1993 (serial numbers beginning with HAK, HAJ and AAN) the specified bed to heater spacing which differs from the specified 27 ± 2 inches (69 ± 5 cm). On Units shipped since to 1993 (serial numbers beginning with HCA and HCC) the specified bed to heater spacing which differs from the specified 27 – 2 , + 9 inches (69 – 5, + 23 cm) due to the increased heater output. Heater to be spacing that differs from those specified will result in incorrect operation and may adversely affect patient.**

For the model 3100 or 3150 perform steps 10 through 15. For the model 3050 skip to step 15.

10. Using the lower hinge bracket as a template mark the mounting holes on the wall for the lower bracket.
11. Remove the warmer from the wall by tapping out the (2) hinge pins from the upper bracket.
12. Remove the lower hinge bracket from the warmer by removing the (2) hinge pins (one on either side) that secure the bracket to the warmer.
13. Repeat steps 5, 6 and 7 to properly install the lower mounting bracket.
14. Mount the warmer by inserting the back of the unit into the upper hinge bracket mounted on the wall, then securing by tapping in the (2) hinge pins. Secure the warmer to the lower mounting bracket by tapping in the (2) hinge pins. Verify that the heater assembly and side rails are rigidly secured to the wall and that the heater is level and is parallel to the floor.
15. Refer to the Operation & Maintenance Manual for checkout procedures.

WARNING

⚠ **Perform Checkout Procedures before placing the unit in operation.**

OHMEDA
Medical

Ohmeda Medical
9065 Guilford Road
Columbia MD 21046-1801
USA
410-381-2555

North America

Customer Service
Datex-Ohmeda, Inc.
Ohmeda Drive
PO Box 7550
Madison, WI 53707-7550
Tel 1 800 345 2700
Fax 1 608 221 4384

Technical Support
Datex-Ohmeda, Inc.
Ohmeda Drive
PO Box 7550
Madison WI 53707-7550
Tel 1 800 345 2755
Fax 1 608 223 2474

Sales
Datex-Ohmeda, Inc.
Three Highwood Drive
Tewksbury, MA 01876
Tel 1 800 635 6099
Fax 1 978 640 0469

Service and Distribution Center
Datex-Ohmeda, Inc.
7750 The Bluffs NW
Austell GA 30168-7754
Tel 1 800 345 2755
Tel 1 770 739 4774
Fax 1 770 739 4770

Canada

Datex-Ohmeda (Canada) Inc.
1093 Meyerside Drive, Unit 2
Mississauga, Ontario
L5T 1J6
Canada
Tel 1 800 268 1472
Tel 1 905 565 8572
Fax 1 905 565 8592

Asia/Pacific

Datex-Ohmeda K. K.
TRC Annex 9F
6-1-1 Heiwajima
Ohta-ku, Tokyo 143-0006
Japan
Tel 81 3 5763 6801
Fax 81 3 5763 6838

Datex-Ohmeda K. K.
Technical Center
TRC A Bldg. AE 4-8
6-1-1 Heiwajima
Ohta-ku, Tokyo 143-0006
Japan
Tel 81 3 5763 6850
Fax 81 3 5763 6852

Malaysia
Datex-Ohmeda
Malaysian Oxygen Berhad
13 Jalan 222
46100 Petaling Jaya
Selangor
Malaysia
Tel 60 3 755 4233
Fax 60 3 756 6389

Singapore
Datex-Ohmeda Pte. Ltd.
152 Beach Road
#12-05/07 Gateway East
Singapore 189721
Tel 65 391 8618
Fax 65 291 6618

Australia

Datex-Ohmeda Pty. Ltd.
Units 1 & 2
149 Arthur Street
P O Box 356
Homebush
NSW 2140
Australia
Tel 61 132 229
Fax 61 297 461796

India

Datex-Ohmeda (India) Pvt Ltd
Oxygen House
P43 Taratala Road
Calcutta 700 088
India
Tel 91 33 478 4401
Tel 91 33 468 9659
Fax 91 33 478 4342

Europe

France
Datex-Ohmeda S.A.S.
Parc de Pissaloup
8 Avenue Jean d'Alembert
78191 Trappes-Cedex
France
Tel 33 1 30 68 60 00
Fax 33 1 30 68 60 01

Datex-Ohmeda S.A.S.
Siege Social Lyon
17, rue Jean-Elysee Dupuy
69410 Champagne Au Mont d'Or
France
Tel 33 04 78 66 62 10
Fax 33 04 78 43 26 58

Germany
Datex-Ohmeda GmbH
Langemarckplatz 3
D 91054 Erlangen
Germany
Tel 49 91 31 81 01 10
Fax 49 91 31 81 01 77

Datex-Ohmeda GmbH
Davis-Ricardo-Strasse 14
D28832 Achim
Germany
Tel 49 421 48 64 211
Fax 49 421 48 64 236

Italy
Datex-Ohmeda S.p.A.
Via Cassanese, 100
20090 Segrate, Milan
Italy
Tel 39 2 21693431
Fax 39 2 26926226

Netherlands
Datex-Ohmeda B.Z.
Kantemarsweg 18
Post Box 22
3870 CA Hoevelaken
Netherlands
Tel 31 33 253 5404
Fax 31 33 253 7223

Spain
Datex-Ohmeda S.L.
C/Manuel Tovar 26
28034 Madrid
Spain
Tel 34 1 334 26 00
Fax 34 1 358 12 84

United Kingdom
Datex-Ohmeda Ltd.
Ohmeda House
71 Great North Road
Hatfield Hertfordshire
AL9 5EN England
Tel 44 1707 263570
Fax 44 1707 260191

Latin America, Caribbean

Datex-Ohmeda Inc.
10685 N Kendall Drive
Miami, FL 33176
USA
Tel 305 273 9940
Fax 305 273 4382

Middle East

Datex-Ohmeda
Middle East Operations
P O Box 5527
Dubai
United Arab Emirates
Tel 97 14 822653
Fax 97 14 822659

For distributor locations worldwide
www.ohmedamedical.com

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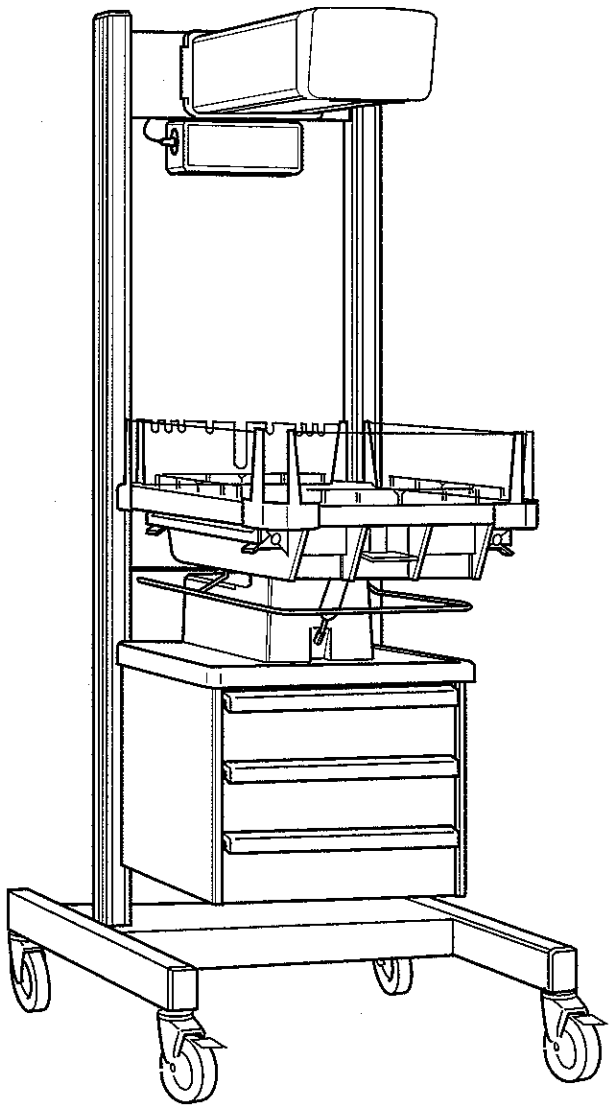
All Models

Operation and Maintenance Manual



User Responsibility

This Product will perform in conformity with the description thereof contained in this operating manual and accompanying labels and/or inserts, when assembled, operated, maintained and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, Ohmeda recommends that a telephone or written request for service advice be made to the nearest Ohmeda Regional Service Center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by Ohmeda and by Ohmeda trained personnel. The Product must not be altered without the prior written approval of Ohmeda's Quality Assurance Department. The user of this Product shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than Ohmeda.

CAUTION: U.S. Federal law and Canadian law restrict this device to sale by or on the order of a licensed medical practitioner.

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